Five-Year Review Report

Second Five-Year Review Report
for the Allied Chemical and Ironton Coke Superfund Site
Lawrence County, Ohio

September 2004

PREPARED BY:

United States Environmental Protection Agency
Region 5
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Approved by:

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Date:

9-13-04

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List of Acronyms

AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COCs	Contaminants of Concern
CPLA	Coke Plant / Lagoon Area
EPA	United States Environmental Protection Agency
GDA	Goldcamp Disposal Area
GPM	Gallons Per Minute
ICs	Institutional Controls
MCLs	Maximum Contamination Levels
NCP	National Contingency Plan
NPL	National Priorities List
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
OU	Operable Unit
OU1	Operable Unit 1, Goldcamp Disposal Area
OU2	Operable Unit 2, Coke Plant / Lagoon Area
OU3	Operable Unit 3, Tar Plant
PRPs	Potentially Responsible Parties
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SVOC	Semi-volatile Organic Compound
TBC	To Be Considered
UAO	Unilateral Administrative Order
WWTP	Waste Water Treatment Plant

Executive Summary

The remedies for the Allied Chemical and Ironton Coke Plant Site in Lawrence County, Ohio included: excavation and proper disposal of contaminated soil, use of certain excavated materials as alternative fuels, installation of containment systems (slurry wall, RCRA cap, hydraulic extraction systems), treatment of contaminated groundwater in an on-site waste water treatment plant, site-wide groundwater monitoring system, and reuse of the properties (one area has been converted into a wetlands and another area has been converted into an industrial use property and sold to the City of Ironton and the State of Ohio Department of Transportation for use as a DOT facility).

The trigger for this Five-Year Review is the completion of the last Five-Year Review on August 27, 1999.

The assessment of this Five-Year Review found that the remedy at the Allied Chemical and Ironton Coke Site is protective of human health and the environment because threats at the Site have been addressed through excavation and disposal of contaminated soil, capping of contaminated soil, maintaining inward hydraulic gradients within the former waste pit, maintaining a groundwater capture zone beyond the boundary of the known extent of groundwater contamination, installation of fencing and warning signs, and implementation of institutional controls.

Five-Year Review Summary Form

Site name *(from WasteLAN)*: Allied Chemical and Ironton Coke Superfund Site		
EPA ID *(from WasteLAN)*: OHD043730217		
Region: 5	**State:** OH	**City/County:** City of Ironton / Lawrence County
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple Operable Units (OU)? ☒ YES ☐ NO	**Construction completion date:** N/A	
Has site been put into reuse? ☒ YES ☐ NO		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency		
Author name: Sharon Jaffess		
Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA, Region 5	
Review period: January, 2004 through August, 2004		
Date of site inspection: July 28, 2004		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion)		
Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU #___ ☐ Actual RA Start at OU# ___ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: August 27, 1999		
Due date *(five years after triggering action date)*: August 27, 2004		

Five-Year Review Summary Form, cont'd.

Issues:

- Iron fouling of wells and protracted capture zone in one sector of the Site due to lowering of pumping rate and higher than normal precipitation.

- Coke fines from the Site were transported to Biomass Energy LLC (Biomass) at the nearby South Point Superfund Site, and these coke fines were to be used as alternative fuel source for an incinerator. Biomass has not yet received a permit to operate their proposed incinerator and the coke fines are stored in a gutted building at the South Point Superfund Site which doesn't provide protection from wind erosion and precipitation.

Recommendations and Follow-up Actions:

- Honeywell has hired a contractor, Mole Master, to rehabilitate wells and piping, is increasing extraction pumping rates, and will drill a replacement extraction well, if necessary.

- Ohio EPA attempted enforcement action against Biomass. Biomass has not yet complied. Ohio EPA has requested EPA's assistance. EPA has discussed the issue with Honeywell. Honeywell claims that because it sold the coke fines to Biomass, it is unable to take any action. EPA will contact Biomass to alert them that the coke fines appear to be improperly stored and to request that Biomass allow Honeywell to reclaim the material for proper disposal, since the material is not being used as an alternative fuel.

Protectiveness Statement:

The remedy at the Allied Chemical and Ironton Coke Superfund Site is protective of human health and the environment because threats at the Site have been addressed through removal of contaminated soil, capping of contaminated soil, maintaining groundwater levels that cause inward hydraulic gradients and capture all of the contaminated groundwater, installation of fencing and warning signs, and implementation of institutional controls.

Other Comments:

None.

ALLIED CHEMICAL AND IRONTON COKE SUPERFUND SITE
LAWRENCE COUNTY, OHIO
FIVE-YEAR REVIEW REPORT

I. INTRODUCTION

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this Five-Year Review Report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP. 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA, Region 5, conducted the Five-Year Review of the remedy implemented at the Allied Chemical and Ironton Coke Superfund Site (Site) in Lawrence County, Ohio. This review was conducted by EPA in consultation with Ohio EPA (OEPA) from January, 2004 through August, 2004. This report documents the results of the review.

This is the second Five-Year Review for the Site. The triggering action for this statutory review is the completion of the first Five-Year Review on August 27, 1999. This Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Event	Date
Ironton Solvay Coke Company builds a Coke Plant.	1917
Merger of companies creates Allied Chemical.	1920
Allied builds a Tar Plant.	1945
Allied uses a sand and gravel pit (later called the Goldcamp Disposal Area) to dispose of Tar Plant process wastes. Other nearby companies also use the pit for disposal.	1945 - 1977
Allied builds a series of lagoons to treat waste from coking operations.	1970s
Allied prepared a closure plan for the Goldcamp Disposal Area and submitted it to the Ohio EPA. Closure work included a groundwater investigation, removal of standing liquids, and placement of a clean soil fill.	1977 - 1980
Allied applies for a RCRA Interim Status permit for the lagoons.	1981
Allied ceases operations at lagoons because no permit is issued (application was filed late and facility failed to achieve RCRA Interim Status).	1982
Ohio EPA requests that the property be listed on the NPL.	1982
Site proposed for the NPL.	December 1982
Final listing on the NPL.	**September 8, 1983**
EPA performs Site Assessment.	October 1983
Phase I of a Remedial Investigation initiated by EPA.	Late October 1983

Event	Date
Negotiations between Allied, EPA, and OEPA concerning performance of the Remedial Investigation and Feasibility Study by Allied under Agency oversight.	October 1983 - April 1984
Administrative Order on Consent for RI/FS signed.	**April 13, 1984**
Draft RI Report submitted by Allied.	February 1985
Final RI Report submitted by Allied.	**July 1986**
Site divided into two operable units: Goldcamp Disposal Area (GDA or OU1) and Coke Plant/Lagoon Area (CPLA or OU2).	Late summer 1986
Administrative Order on Consent for Removal Action, providing for the removal of tanks at the Coke Plant.	**March, 1987**
OU1 Feasibility Study and Endangerment Assessment completed.	July 1988
EPA published notice of FS completion and issued a Proposed Plan for public comment for OU1.	August 8, 1988
EPA issued notice letters to Allied and AMCAST pursuant to Section 122(e)(2)(A) of CERCLA requesting a good faith offer for implementation of the OU1 remedy	August 8, 1988
OU1 Public Meeting	August 16, 1988
OU1 Record of Decision (ROD) signed.	**September 29, 1988**
OU1 RI/FS Complete	**September 29, 1988**
Unilateral Administrative Order (V-W-89-C-007) issued to Allied and AMCAST for performance of Remedial Design and Remedial Action (RD/RA) pursuant to the ROD.	**March 9, 1989**
OU1 Pre-Design Investigation	1990 - 1991

Event	Date
Allied initiates OU2 FS	Early 1989
OU1 RD Start	**March 9, 1989**
OU2 ROD signed	**December 28, 1990**
OU2 Unilateral Administrative Order (UAO) issued to Allied for performance of OU2 Remedial Design and Remedial Action (RD/RA).	**July 1, 1991**
OU1 Remedial Design	1991 - 1993
OU1 Design Report submitted and finalized	September 1992 - December 1993
OU1 construction of perimeter barrier (slurry wall)	1993 - 1994
OU1 RA Start	**July 15, 1993**
OU2 Pre-Design Field Investigation Reports submitted for bioremediation, groundwater, and beneficial waste fuel recovery	September 9, 1993
OU2 (Ice Creek) quarterly monitoring program initiated	October 12, 1993
OU2 Submission of bioremediation and groundwater and facilitiies engineering preliminary design reports	November 13, 1993
OU1 construction of wells	1994
OU1 Remedial Action Monitoring Plan submitted	April 1994
OU2 Initiation of site preparation work, including geotechnical field investigation in support of remedial action facilities construction and excavation and on-site stockpiling of soils area No. 4	April 25, 1994
OU1 RD Complete	**May 10, 1994**
OU2 Submission of bioremediation and groundwater intermediate design report	May 14, 1994

Event	Date
OU1 construction of RCRA subtitle C compliant cap, passive gas venting system, groundwater extraction system, and other general construction	1995
OU1 Perimeter Barrier Installation Report documents compliance with slurry wall performance standards (1×10^{-8} cm/sec permeability).	March 1995
OU1 Cap/Pump and Treat Installation Report documents that the cap permeability (1×10^{-7} cm/sec permeability) and performance standards are met.	September 1995
OU1 Well Installation Report documents compliance with construction performance standards and documents that the groundwater pump and treatment system is operational and functional.	January 1995
OU1 EPA Final Inspection of construction	**August 2, 1995**
OU1 EPA determination of Operational and Function	**August 2, 1995**
OU1 Remedial Action Report, documenting completion of remedial actions for the GDA (perimeter barrier / slurry wall construction, well installation, multimedia cap, groundwater collection system, and groundwater treatment) submitted.	September 19, 1995
OU1 RA Report Final Approval & RA Complete	**September 19, 1995**
OU2 initial phases of site soils field investigation performed	July 27, 1994 - June 13, 1995
OU2 Construction of stormwater retention pond completed	July 31, 1995
OU2 & OU1 EPA issues ROD amendment #1	**July 31, 1995**

Event	Date
OU2 Submission of bioremediation and groundwater pre-final design report	December 15, 1995
OU2 Remedial Action construction contract awarded for bioremediation and groundwater and facilities components	March 4, 1996
OU2 Allied submits petition to EPA to review the OU2 remedy	August 23, 1996
OU2 Construction halted on in-situ bioremediation component of remedy while petition under evaluation	August 27, 1996
OU2 Excavation and back filling of AC Soils area completed; materials disposed off-site	May 29, 1997
OU2 Lagoon No. 5 field characterization and boring program completed	June 12, 1997
OU2 Start-up of modified waste water treatment plant and groundwater pumping system operations	July 1997
OU2 Quarterly groundwater monitoring program initiated	August 18, 1997
OU2 EPA issues ROD amendment #2	**September 4, 1997**
OU2 Removal of ROD Soils Area No. 4 stockpiled materials (previously excavated in 1995); materials disposed off-site	September 30, 1997
OU2 Excavation and backfilling of Neal Junkyard portion of ROD Soils Area No. 1 completed; materials disposed off-site	April 30, 1998
OU2 Excavation and backfilling of ROD Soils Area No. 1 (portion on Allied property) and ROD Soils Area No. 3 (excluding Truck Scale area) completed; materials disposed off-site	May 25, 1998
OU2 Excavation, backfilling, and on-site stockpiling of Site Soils areas (delineated between 1994-97) completed	July 31, 1998

Event	Date
OU2 EPA issues ROD amendment No. 3	**September 30, 1998**
OU2 Excavation and backfilling of Tar Plant ROD Soils Area Nos. 5,6, and 7 completed; materials disposed off-site	November 16, 1998
Merger between Allied and Honeywell — Honeywell takes ownership of the Site	1999
OU2 Remediation of Lagoon No. 2 "hot spots" completed, including excavation and backfilling with clay materials removed from Lagoon No. 5; excavated materials shipped to Biomass facility for use as an alternative fuel	July 30, 1999
OU2 Remediation of Lagoon No. 5 completed, including excavation, backfilling (with clean hard fill and stockpiled site soils and crusher fines; erosion control and revegetation)	October 31, 1999
OU2 Excavation and backfilling of remaining Site Soils areas, including Truckers' Parking Lot and area adjacent to East Tank Farm, completed. Acceptable materials placed into Lagoon No. 5; remaining materials disposed off-site	September 30, 2000
OU2 Placement of final six-inch layer of imported fill over excavated Lagoon No. 2 "hot-spot" areas	October 31, 2000
Tar Plant operations shut down.	December 31, 2000
Honeywell submits Tar Plant closure Site Management Plan to Ohio EPA	March 2001
Tar Plant decontamination and demolition activities initiated pursuant to Ohio Cessation of Regulated Operations	May 29, 2001
OU2 Floodwall slope restoration activities completed	May 31, 2001

Event	Date
OU2 Remediation of East Side Batteries Area completed, including excavation, backfilling, and regrading; acceptable excavated materials placed along toe of Floodwall Slope in lagoon area; remaining materials disposed off-site	October 31, 2001
OU2 Excavation and backfilling of ROD Soils Area No. 3 - Truck Scale Area completed; materials disposed off-site	October 31, 2001
OU2 Remediation activities for the "uplands" portion completed	November 30, 2001
OU2 First wetlands assessment monitoring performed	July - August 2002
OU2 Lagoon Area Vegetation and Benthic Macroinvertebrate Monitoring Report submitted	October 2002
Tar Plant designated OU3	March 2003
OU3 EPA initiated negotiations with Honeywell for performance of an RI/FS at the Tar Plant	March 27, 2003
OU3 Administrative Order on Consent (V-W-03-C-755) issued	August 22, 2003
OU3 RI/FS Work Plan submitted	February 18, 2004
OU3 RI/FS Work Plan revision submitted	July 16, 2004
OU2 Second wetlands assessment monitoring performed	July - August 2004
Site-Wide (OU1 and OU2) Groundwater extraction, treatment, and quarterly monitoring program, O&M activities	On-going
OU2 Ice Creek semi-annual monitoring program	On-going

III. BACKGROUND

Physical Characteristics

The Site is located in the city of Ironton, Lawrence County, Ohio (Map 1 and Map 2). It encompasses approximately 95 acres, including the former Coke Plant and five former lagoons (Coke Plant/Lagoon Area), the former Tar Plant, portions of the adjacent Ice Creek, and the Goldcamp Disposal Area (GDA). The GDA is a former sand and gravel pit used for disposal of tar plant waste and foundry sand. The Coke Plant/Lagoon Area (CPLA) is bordered on the south and east by Ice Creek. Near the southern end of Ice Creek, at the point where it empties into the Ohio River, lies the Village of Coal Grove. The Ohio River lies approximately 500 feet west of the former Tar Plant. Both the former Tar Plant property and the GDA lie on a relatively flat alluvial terrace above the 100-year flood level of the Ohio River. Portions of the CPLA lie within the 100-year flood plain. Much of the Site area is covered by a fill that overlies the native soils.

Land and Resource Use

The City of Ironton, founded in 1849, encompasses 4.1 square miles along the banks of the Ohio River. The City's population is 11, 211 (2000 census). It was once the largest center of pig iron production in the world. Consequently, heavy industry flourished in Ironton in the last century. Industries in Ironton include coal loading and processing, oil terminals, chemical manufacturing and storage, and steel manufacturing.

The Site is located in the southeastern section of Ironton and is surrounded by other industries, businesses, private residences, and waterways. The residential areas are northwest and along the southern edge of the site. In addition to private homes, there is one elementary school, baseball diamonds along the northern boundary of the Site, and seven other schools within 2 miles of the Site. A cemetery lies northeast of the Site.

Directly adjacent to the Site, bordering the east and south, is Ice Creek, a tributary of the Ohio River. Past Ice Creek to the south is the Village of Coal Grove. A resident's junk yard (Neal Junk Yard) also lies along 450 feet of the Site's southern boundary. The Ohio River lies approximately 500 feet to the west of the Tar Plant.

The Village of Coal Grove's primary drinking water source is the Coal Grove well field. This well field is only 2000 feet south of the Coke Plant area. In March 1988, volatile organic compounds (primarily trichloroethylene) were detected in one of these wells. This contamination was linked to another facility, the Tri-State Tank Cleaning facility.

Ironton, on the other hand, extracts 1 to 2 million gallons per day from the Ohio River to meet its drinking water needs. Ironton's water intake is approximately 2 miles down river from the Site. The Ohio river is also used by Honeywell for the discharge of treated wastewaters associated with ongoing groundwater remedial actions.

This sector of the Ohio River is known as the Greenup Pool, which is just upstream of the Greenup locks. This area is occupied by several municipalities in addition to Ironton and Coal Grove: South Point, Ohio; Ashland, Kentucky; Catlettsburg, Kentucky; and Kenova, West Virginia. The Greenup Pool is highly industrial and has more barge traffic than any other section of the Ohio River according to the Ohio River Valley Water Sanitation Commission. Industries along the Ohio River include steel mills, paper mills, coal processing facilities, manufacturers of coke and coal products, chemicals, pottery, and tools. There are 51 National Pollution Discharge Elimination System permits for this section of the Ohio River above the Greenup locks and dam.

Honeywell's Site Restoration Plan calls for placing as much of the Site into beneficial re-use as feasible. Two parcels (approximately 1.1 acres in total) outside the GDA's slurry wall and cap perimeter and the uplands parcel of the CPLA (approximately 37 acres in total) have been deemed appropriate for industrial re-use and do not require any further action. These 37 acres were conveyed to Ironton in the fall of 2002 as part of a Brownfields redevelopment effort. More recently, Ironton conveyed part of this land to the State of Ohio Department of Transportation (ODOT). ODOT has since constructed a county garage from which it will conduct its highway maintenance activities, including, but not limited to, snow and ice removal, salt storage, equipment maintenance and storage, pavement maintenance, and other roadway operations. ODOT has also constructed office space for its county manager and clerical staff (Photograph 1).

The "lagoon area" section of the CPLA was originally constructed in the 1970s to serve as a place for Allied to discharge and treat liquid wastes (previously the liquid wastes were discharged directly onto swampy lands that discharged directly into Ice Creek). This area is currently being converted into a wetlands system, taking advantage of its natural flooding conditions and predisposition to wetlands-type vegetation (Photograph 2).

History of Contamination

The Coke Plant began operations in 1917. In 1920, when Allied Chemical and Dye Company (Allied) was formed, the plant became a unit of its Semet-Solvay Division. In 1977, the Site and its operating facilities were sold to McClouth Steel Corporation (McClouth) which operated the plant as a subsidiary, Ironton Coke Corporation. McClouth filed for bankruptcy in 1980. Consequently, the Coke Plant was shut down in 1982. Following closure of the plant, the property and facilities were purchased by Iron City Fuels, Inc. In March 1984, Allied purchased the Coke Plant property, with the exception of the surface facilities which were retained by Iron City Fuels. Iron City Fuels continued to salvage material from these surface facilities until March 1985, at which time ownership of these facilities were transferred to Allied (later to become known as AlliedSignal). Today, the property is owned by Honeywell, as a result of a 1999 merger between AlliedSignal and Honeywell.

Products from the coking operation included: crude tar; coke; light oil; and ammonia. During the period from 1920 through the 1960s, wastewater and solid wastes generated in the coking process were discharged into marshy areas east of the plant adjacent to Ice Creek. These waste streams

included: process wastewater, coke and coal fines; tar decanter sludges; boiler ash; and w eak ammonia liquor. Specific constituents present in these waste streams included: ammonia; benzene; cyanide; metals; naphthalene; phenolics; and polynuclear aromatic hydrocarbons (PAHs). In the early 1970s, a series of lagoons was constructed in the eastern area of the plant for the purpose of treating these waste streams. In 1982, the Coke Plant and lagoon operations were shut down following the McClouth bankruptcy filing.

Operations at the Tar Plant began in 1945 as a unit of Allied Chemical and Dy Company's Barrett Division. The operations were designed to manufacture products from the crude tar produced in the Coke Plant. Specific products from the operations included: phthalic anhydride; creosotes; pitches; naphthalene; and anthracene. Generated wastes and residues were disposed in the nearby GDA, a former sand and gravel pit, up until 1977 when the GDA was shut down. Following the GDA shutdown, the Tar Plant continued to operate as a unit of Allied, and eventually transitioned to a unit of AlliedSignal's Engineered materials Sector in the mid-1980s. In 1998, the creosote product line was sold to KMG-Bernuth, followed by the acquisition of various carbon material product lines by Reilly Industries in 1999, and the sale of the naphthalene product line to Recochem in 2000. The Tar Plant was shut down in December 2000, with the buildings, process structures, and land remaining under the ownership of Honeywell, as a result of the 1999 merger between AlliedSignal and Honeywell.

Initial Response

The Ironton Coke Site was placed on the NPL in September 1983. This assignment was made at the request of OEPA, based upon the results of investigations conducted between 1978 and 1983. These original investigations indicated the existence of groundwater contamination and its off-site migration, potentially posing a threat to human health and the environment.

A remedial investigation and feasibility study (RI/FS) was subsequently initiated by EPA; however, negotiations between EPA, OEPA, and Allied resulted in Allied taking over the project in 1984, pursuant to an Administrative Order on Consent (AOC) signed on April 13, 1984. Following completion of the RI in 1986, EPA, OEPA, and Allied jointly agreed to divide the Site into two operable units. This was done in order to expedite the completion of the FS for the GDA, designated as OU1. Accordingly, the GDA FS was completed in August 1988 followed by the issuance of the GDA Record of Decision on September 29, 1988, and a Unilateral Administrative Order (UAO) on March 9, 1989 for the performance fo the GDA Remedial Design and Remedial Action (RD/RA). During the FS, the discovery of non-aqueous phase substances (NAPS) near the bedrock below the GDA, required (as per the ROD) that a supplemental NAPS RI/FS be performed to determine if the original ROD remedy would still be effective. The results of this supplemental investigation showed the original remedy to be protective, with requirements added for the expansion of the planned groundwater treatment system. An Explanation of Significant Difference (ESD) was issued by EPA shortly thereafter to document this change to the GDA remedy.

The FS for the CPLA operable unit (OU2), was completed in July 1990. Prior to this, a UAO was issued to Allied in March 1987 outlining the requirements for decontamination and demolition of the Coke Plant processing facilities. The bulk of this demolition work was subsequently performed by Allied during the late 1980s and early 1990s, prior to the start of remedial action construction activities. The CPLA ROD was signed on December 28, 1990, followed by the issuance of a UAO on July 1, 1991 for the performance of the CPLA RD/RA.

Three subsequent ROD Amendments dated July 31, 1995; September 4, 1997; and September 30, 1998 provided modifications to the original CPLA ROD.

Basis for Taking Action

The 4-acre GDA was a 40 feet deep sand and gravel pit utilized by Allied for the disposal of Tar Plant process chemical wastes from 1945 to 1977. Wastes included: anthracene residue; anthracene salts; phthalic anhydride residue; and miscellaneous process wastes from the Tar Plant. The distillation bottoms from the production of phthalic anhydride from naphthalene are a listed hazardous waste (KO24). The GDA was also used by the Dayton Malleable Iron Company/Ironton Iron, Inc. for the disposal of foundry sand containing heavy metals, phenolics, and oils.

The wastes in the GDA were infiltrated by groundwater and the groundwater traveled west toward the Ohio River, with a northerly component toward Ironton Iron's production wells located only 100 feet to the north. The investigation confirmed contamination in the soil and groundwater. The off-site production well showed benzene levels up to 36 parts per billion. Non-aqueous phase substances (NAPS) were also found. The volume of contaminated soil within the GDA was estimated to be approximately 300,000 cubic yards. The surface of the GDA, though previously dewatered and capped with clay, was also found to be problematic because many substances oozed up through the clay and pooled on the surface.

The following tables highlight contaminants found in the groundwater at the Site derived from the various source areas including the GDA, CPLA, and Tar Plant.

Results of Groundwater Investigation

Chemical (ppb)	1983	1984	1989	Comparison Value (ppb)
Benzene	ND-4,310	ND-1,400	ND-63	5[1]
Styrene	ND-9,700	ND-38	ND	100[1]
Toluene	ND-72	ND-39	11-19	2,000[1]
Xylene	ND-23,000	ND-120	15-110	10,000[1]
Ethylbenzene	ND-370	ND-35	15-54	700[1]
Acenaphthene	ND-3,200	ND-2,300	280-7,000	2,100[2]
Aniline	ND-290	ND	ND	63[3]
Benzo(a)pyrene	ND-560	ND-47	ND	0.05[3]
Benzo(g,h,i)perylene	ND-160	ND	ND	140[2]
Fluoranthene	ND-2,000	ND-1,500	370-4,000	1,400[2]
Fluorene	ND-1,800	ND-890	390-4,000	1,400[2]
2-Methylnaphthalene	ND-7,700	ND	410-11,000	NA
4-Methylphenol	ND	ND-330	ND	NA
Naphthalene	ND-19,000	ND-3,400	1,600-29,000	140[2]
Phenanthrene	ND-4,400	ND	850-8,500	140[2]
Phenol	ND	ND-110	ND	20,000[4]
Pyrene	ND-1,700	ND	230-3,100	1,000[4]
Arsenic	ND-57	ND-70	----	11[4]
Lead	ND-62	ND-50	----	15[5]
Cyanide	ND-22,000	ND-2,800	ND-40	200[1]

ND = Not Detected
ppb = Parts Per Billion
1 = U.S.EPA Maximum Contaminant Level (MCL)
2 = Comparison Value Calculated by ODH
3 = Cancer Risk Evaluation Guide by ODH
4 = ATSDR EMEG
5 = U.S.EPA Action Level
NA = None Available

Off-Site Groundwater Data

Chemical (ppb)	Coal Grove Wells	Monitoring Wells	Comparison Value ppb
Benzene	ND	ND-260	5[1]
1,2-dichloroethane	ND	42	70-100[1]
Toluene	ND	67	2,000[1]
Xylene	ND	27	10,000[1]
Phenolics	ND	ND-90	20,000[2]
Naphthalene	ND	ND	60-140[3]
Cyanide	ND	ND-830	200[1]
Lead	980	----	15[4]
Arsenic	BDL	BDL	5-11[2]

1 = U.S.EPA Maximum Contaminant Level (MCL)
2 = Comparison Value Calculated by ODH
3 = ATSDR EMEG
4 = U.S.EPA Action Level
ND = Not Detected
BDL = Below Detection Limit
ppb = parts per billion
Reference = IT Corporation, 1986

An endangerment assessment was conducted in 1986 which noted the following contaminants of concern: benzene, naphthalene, phenolics, PAHs, cyanide, ammonia, sulfates, and chlorides. The PAHs selected as indicator chemicals were: benzo(a)pyrene, benz(a)anthracene, dibenz(a,h) anthracene, and chrysene. The risks are related to the carcinogenicity of PAHs and benzene and the exposure pathways through groundwater (to the Ohio River and the production wells).

The CPLA OU consists of the area occupied by the former Coke Plant batteries and processing facilities, the lagoon area, the Tar Plant area, and portions of Ice Creek (contaminated sediments). The Tar Plant contained several areas in which the soils were contaminated with organic chemicals as a result of spillage (approximately 2,000 cubic yards). The Coke Plant investigation also showed several areas where soil was contaminated by spillage and general operations (approximately 38,000 cubic yards).

In addition, the five lagoons that were used to receive process wastewater and solid hazardous waste from the Coke Plant were confirmed to be highly contaminated. Lagoon 5 contained a listed hazardous waste (Decanter Tank Tar Sludge, K087). Lagoons 1 and 3 also contained a listed hazardous waste (Lime Kiln Sludge K060). Lagoons 1 through 4 contained approximately 457,000 cubic yards of contaminated materials. Lagoon 5 contained approximately 122,000 cubic yards of contaminated materials.

Sampling also demonstrated contamination of the sediments in Ice Creek (phenolics, PAHs in the form of naphthalene, ammonia, and cyanide). The contaminated sediments totaled approximately 150,000 cubic yards. In order to ascertain the effects of the sediment contamination, 214 fish were collected. No neoplastic lesions were observed. Therefore, it was concluded that the concentrations of site-related contaminants in the Ice Creek stream sediments do not have an adverse effect on fish. In addition the water quality in Ice Creek was tested. The analysis indicated that concentrations of chloride and ammonia were greater downstream of the Site than upstream, but were still well below EPA Water Quality Criteria. The water was analyzed for PAHs and none was detected.

Ice Creek Sediment Samples

CHEMICAL	CONCENTRATION (ppm)
Ammonia	0.22-390
Cyanide	ND-8.7
Phenolics	0.2-1.8
Benzene	ND
Naphthalene	ND-12

ND = Not Detected
ppm = Parts Per Million

Ice Creek Fish Data

Chemical	Concentration (ppm)
Bis-2-ethylhexyl phthalate	ND-17.4
Di-n-butyl phthalate	ND-6.8
Phenol	ND-15.9

ND = Not Detected
ppm = Parts Per Million

In summary, concerning OU1 and OU2, soil samples showed the on-site surface soil to be contaminated with cyanide, phenolics, benzene, naphthalene, and benzo (a) pyrene (a polynuclear aromatic hydrocarbon). Groundwater analysis detected a number of volatile and semi-volatile organic compounds plus cyanide. Sediment samples from Ice Creek, a stream bordering the lagoon area, contained low levels of cyanide, phenolics, and naphthalene.

The groundwater underlying the CPLA was similarly contaminated as the groundwater underlying the GDA. The most prevalent groundwater contaminants included: phenolics; ammonia; cyanide; chloride; naphthalene; and benzene. The potential impacts of contaminated groundwater on the local populations were through the Coal Grove Well Field, through the Ironton Public Water Supply Intake in the Ohio River, and through the Ironton Iron/Amcast production wells.

Coal Grove Groundwater Data
1988-1990

CHEMICAL	CONCENTRATION (ppb)	COMPARISON VALUE (ppb)
Raw Water from Wells #2 and #3		
cis-1,2 Dichloroethene	1.0-17.0	70[1]
Trichloroethene	ND-8.57	5[1]
Finished Plant Water		
cis-1,2 Dichloroethene	ND-0.96	70[1]
Bromoform*	ND-7.35	100[1]
Bromodichloromethane*	ND-0.4	300-700[2]
Dibromochloromethane*	ND-2.24	300-700[2]

ND = Not Detected ppb = parts per billion * = By-product of the chlorination process
1 = U.S.EPA Maximum Contaminant Level 2 = Comparison Value Calculated by ODH

Ice Creek and Ohio River Surface Water

Chemical	Ice Creek	Ohio River	Comparison Value ppb
Cyanide	ND	ND-94	200[1]
Benzene	ND	ND-32	5[2]
Naphthalene	ND	ND-12	140[1]
Ammonia	3-6,400	200-900	30,000[3]
Lead	4.5-11.6	13.8	15[4]
Arsenic	ND-4.0	2.1	11[2]

ND = Not Detected ppb = parts per billion 1 = U.S.EPA Maximum Contaminant Level (MCL)
2 = Comparison Value Calculated 3 = U.S.EPA Health Advisory 4 = U.S.EPA Action Level

Ice Creek and Ohio River Sediment

Chemical (ppm)	Ice Creek	Ohio River*
Carbon disulfide	0.012 - 0.1	ND
Acenaphthene	15.4	ND
Anthracene	9.26	ND
Benzo(a)anthracene	104	11.6
Benzo(a)pyrene	49.9	4.02
Benzo(b)fluoranthene	44.7	5.86
Benzo(g,h,i)perylene	39	3.85
Benzo(k)fluoranthene	43.6	ND
Chrysene	44.2	6
Dibenzo(a,h)anthracene	14.4	ND
Fluoranthene	57.1	8.75
Fluorene	9.66	ND
Indeno(1,2,3-c,d)pyrene	31.9	ND
Naphthalene	92.5	ND
Phenanthrene	38.7	5.6
Pyrene	43.5	7.01
Arsenic	ND-0.049	0.002
Lead	ND-0.53	0.014
Cyanide	ND-0.11	----

ppm = Parts Per Million
ND = Not Detected
Reference = IT Corporation, 1986
* Data were only available for one Ohio River station.

A site-specific risk assessment was also performed in 1990. The results of the baseline assessment (assuming no remedial actions taken and a reasonable maximum exposure scenario involving hypothetical future on-site residents) showed unacceptable cancer risks to children and adults attributable to potential exposure to PAHs in soils, and benzene and arsenic in groundwater. Unacceptable non-cancer risks were also identified as a result of child/adult potential exposure to cyanide in the groundwater. As specified by the Agency for Toxic Substances and Disease Registry in their May 16, 1994 Public Health Assessment, the Site posed a public health hazard because of the potential for long-term exposure to cyanide, benzo(a)pyrene, and naphthalene in Site soils. The Site also posed an indeterminate public health hazard because of the potential impact on a public water supply. The residents who obtain their drinking water from the Coal Grove well field were potentially at risk of exposure to chemicals originating from the Site.

IV. REMEDIAL ACTIONS

Remedy Selection

Two RODs were signed for this Site. The first was for OU1/GDA on September 29, 1988. The second was for OU2/CPLA on December 28, 1990. The remedial action goals in both RODs for the Site were to minimize risks to public health and the environment from direct contact with contaminated materials and to minimize the migration of contaminants into groundwater.

The major components of the OU1/GDA remedy included:

- Construction of a low permeability slurry wall encircling the GDA;
- Creating an inward groundwater gradient within the slurry wall boundaries;
- Installation of a multi-media RCRA-compliant cap over the surface of the GDA;
- Treating groundwater extracted from inside and outside of the slurry wall at a new on-site treatment facility;
- Municipal water hook-up for in-plant potable and sanitary uses at Ironton Iron Inc.
- Monitoring Site groundwater;
- Securing the Site from unauthorized personnel and implementation of deed restrictions; and
- Non-aqueous phase substance (NAPS) investigation and implementation of the EPA-approved remedy, if different than the present containment alternative.

The major components of the OU2/CPLA remedy included:

- Incineration of approximately 122,000 cubic yards of lagoon waste materials, and on-site re-use of the waste heat generated during incineration (Waste Fuel Recovery);
- In-situ bioremediation of approximately 457,000 cubic yards of lagoon waste material;
- Prepared-pad surface bioremediation of approximately 40,000 cubic yards of contaminated soil materials;
- Pumping and on-site treatment of groundwater;
- Monitoring of groundwater downgradient of Ice Creek and preparation of a contingency plan;

- Fencing, security, and deed restrictions; and
- Evaluation of the effectiveness of in-situ bioremediation, with a contingency for development of an alternative remedial action for Lagoons 1 through 4.

The OU2/CPLA ROD was amended three times: July 31, 1995; September 4, 1997, and September 30, 1998.

The ROD amendments allowed the following modifications:

- Revised the clean-up standards for benzo(a)pyrene and dibenz(a,h) anthracene in groundwater for the GDA and CPLA;
- Excavation and storage on-site for eventual treatment or placement into the lagoon area of 135,000 cubic yards of soils found to be contaminated with low levels of PAHs during the design phase;
- Replaced prepared-pad bioremediation of 40,000 cubic yards of soil with off-site disposal in an approved landfill;
- Replaced in-situ bioremediation of 457,000 cubic yards of soil in Lagoons 1 through 4 with hot spot excavation and wetland development; and
- Replaced incineration of Lagoon 5 materials with recycling, treatment, and/or disposal of the KO87 listed waste in an approved off-site hazardous waste facility and the use of the remaining material, excluding debris, as an alternative fuel.

Remedy Implementation

OU1/GDA

EPA issued a UAO on March 9, 1989 for performance of the GDA Remedial Design/Remedial Action to Allied and AMCAST Industrial. A pre-design investigation occurred between 1990 and 1991 and the design documents were prepared between 1991 and 1993.

Remedial construction activities at the GDA began in July 1993 after completion of the remedial design. Construction of the Perimeter Barrier was accomplished between 1993 and 1994. The wells were constructed in 1994 and the cap, groundwater extraction system, and other general construction activities occurred between 1994 and 1995.

Work included:

- Construction of a soil-bentonite perimeter barrier to enclose the capped GDA wastes. The perimeter barrier is designed to provide a low permeability barrier to ground water in-flow and contaminant migration. This "slurry wall" has a permeability of approximately 1×10^{-8} cm/sec which is superior to the 1×10^{-7} cm/sec permeability requirement. The Perimeter Barrier Installation Report, dated march 1995, documents the compliance with the slurry wall construction performance standards. One change to the slurry wall performance standards has been that the slurry wall was not keyed into the competent bedrock due to concerns that

keying efforts would fracture the massive bedrock and affect its competence and water bearing capabilities. This change was documented in the Perimeter Barrier Data Report dated May 1992, the Design Report dated September 1992, and the Design Report Response dated December 1992.

- Construction of a permanent cap incorporating a geosynthetic clay liner to minimize future exposure of the buried waste and minimize infiltration. The cap is a RCRA Subtitle C compliant cap with a permeability of less than 1 x 10^{-7}cm/sec. The cap included a passive gas venting system with capabilities for adding an emissions control system in the future, if needed. The design of the cap and its features were presented in the Cap Data Report dated March 1992, and the Design Report dated September 1992. The permeability performance standard and the other cap performance standards listed in the Order have been met and are documented in the Cap/Pump & Treat Installation Report, dated September 1995.

- Installation of groundwater pumping wells inside the slurry wall (PW-3 and PW-4) to maintain an inward hydraulic gradient. Pursuant to information presented in the Design Report dated September 1992, and the Design Report Response dated December 1992, EPA revised the required groundwater drawdown from ten feet to one foot. The revision to one foot would still maintain the required inward gradient. Groundwater pumped from inside the GDA slurry wall is treated in the on-site WWTP. The Well Installation Report, dated January 1995, documents the compliance with the construction performance standards.

- Installation of groundwater pumping wells outside the slurry wall (PW-1 and PW-2) to intercept and withdraw contaminated groundwater. Groundwater pumped from outside the GDA slurry wall is treated in the on-site WWTP and discharged in compliance with the NPDES permit. The Well Installation Report, dated January 1995, documents the compliance with the construction performance standards.

- Construction of treatment add-ons to the existing WWTP (part of the Tar Plant operations) to treat extracted groundwater from inside and outside the GDA, including biological and carbon adsorption polishing systems;

- Installation of wells to monitor the remedial action performance including the containment of dissolved and free phase contaminant plume migration;

- Delineation of the NAPS layer and evaluation of potentially feasible technologies to address this layer; and

- Construction of a perimeter security fence.

In addition, during the early stages of the RA, an alternative water supply was provided to Ironton Iron Inc. Final inspection of the GDA remedy was conducted on August 2, 1995. The PRPs submitted a Remedial Action (RA) Report on September 6, 1995. It was revised on September 14, 1995, and EPA approved the Final RA Report on September 19, 1995.

Installation of the remedial action components was performed in accordance with the design and specifications contained in GDA Construction Contract No. 1 (perimeter barrier); No. 2 (well installation); and No. 3 (general construction).

OU2/CPLA

EPA and Allied entered into a Consent Order in March 1987 requiring Allied to dismantle and decontaminate the Coke Plant processing facilities. The bulk of this demolition work was performed during the late-1980s and early 1990s prior to the start of the remedial action construction activities for the rest of the CPLA. EPA issued a UAO to Allied on July 1, 1991 for the performance of the CPLA RD/RA.

An RD/RA Work Plan was prepared to document the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of the remedial actions. Supplemental to the RD/RA Work Plan, additional documents were developed including a Quality Assurance Project Plan, Health and Safety Plan, and a Permitting Plan (May 1992). To provide additional data for performance of the RD, technology specific Sampling and Analysis Plans (SAPs) were developed for implementation of the pre-design field investigations. The remedy was divided into three major components, including: bioremediation; Groundwater and Facilities; and Waste Fuel Recovery (WFR). Accordingly, a combined SAP was prepared for the Bioremediation and Groundwater and Facilities components, and a separate SAP was prepared for the WFR component. These SAPs were issued in May 1992 and March 1992 respectively, and focused on the collection of additional field and treatability study information to support the CPLA design outlined in the ROD and UAO.

With the exception of the in-situ bioremediation field pilot study which was formally started in August 1991, the remaining supplemental investigations/studies were conducted between January and July 1992. The results from each of the supplemental investigations were presented in the respective Bioremediation, Groundwater, and WFR Pre-Design Data Summary Reports (August 1993).

The designs of the three principal CPLA remedy components were to be prepared and submitted in distinct phases: Preliminary, Intermediate, Pre-Final, and Final Design.

Preliminary designs were prepared for the respective components of bioremediation and groundwater and were issued in November 1993 for the Agencies' review. The groundwater document also included information to support the design of associated infrastructure and facilities deemed common to the overall CPLA remedy, and was thus submitted as the Groundwater and Facilities Preliminary Design. The designs were commensurate with an approximate 30% level of completion, reflecting the incorporation of sufficient technical information to determine the constructability and functionality of the proposed remedy components to satisfy the CPLA clean-up goals and objectives. A WFR Preliminary Design was not formally submitted, as various aspects (including air emission controls and additional pilot testing) of the proposed technology were still being evaluated as part of continuing pre-design activities.

Based on the inherent interdependencies that were observed to exist between the bioremediation and groundwater and facilities designs, it was determined that a combined Intermediate Design could be issued for these components. As such, the Bioremediation and Groundwater Intermediate Design was submitted in May 1994 to reflect the Agencies' comments on the respective preliminary designs, and to incorporate additional design information corresponding to an approximate 60% level of completion. WFR pre-design activities continued throughout this time and this portion of the design was placed on a deferred completion schedule relative to the bioremediation and groundwater components.

The Pre-Final Bioremediation and Groundwater Design (corresponding to a 90% level of completion) was submitted to EPA and OEPA in September 1995. Following EPA and OEPA review and incorporation of comments, the Final Bioremediation and Groundwater Design was submitted in December 1995 and was also issued to prospective contractors for bidding. WFR pre-design activities were still ongoing, with considerations now being given to possible removal of the beneficial energy recovery requirements and also to potential leasing of the thermal treatment equipment. Based on the information available at that time, the WFR Design was projected for completion in mid-1997.

During the preparation of the design, additional studies and investigations resulted in several significant changes relative to specific information that was contained in the ROD, some of which necessitated three ROD amendments. However, one significant change that was not addressed by a ROD amendment was also made. This concerned the revision of the arsenic clean-up goal for soils. As per the ROD, the arsenic clean-up goal for soils was established as 0.56 mg/kg. Based on a compilation of site-specific data collected during 1994, a petition was submitted to EPA and OEPA in March 1995 to provide a statistical evaluation of site-measured arsenic concentrations as compared to regionally established background concentrations. This petition resulted in the Agencies' adoption of a revised clean-up goal of 15 mg/kg for arsenic in soils.

Although actual construction activities in support of the Bioremediation and Groundwater components were initiated in early 1996 (with the award of the construction contract), preliminary site preparation and characterization work was performed by Honeywell during 1994-1995, in parallel with the finalization of the CPLA design. Additionally, construction of the CPLA Stormwater Collection/Management System was completed in 1995 following the March 1995 issuance of the CPLA Stormwater Pollution Prevention Plan.

During early 1994, a drilling program was performed to gather geotechnical data to support the design of foundations for the planned remedial action facilities. The drilling program focused on areas west of the former coke oven battery locations, and in addition to providing the required geotechnical information, resulted in the identification of soils materials potentially requiring treatment. Additional sampling was performed to delineate the contamination of these "site soils" which was followed by excavation and on-site stockpiling. Soils materials in the coal overburden area were also excavated and separately stockpiled.

The "site soils" were found to encompass a wide-spread area generally located west and south of the former coke oven batteries, although other pockets of contamination were encountered throughout the course of remediation and were addressed as discovered. A detailed evaluation to identify potential options for handling the "site soils" was made, as directed by the EPA and OEPA. ROD Amendment #1 details the decision made for these "site soils:" placement into the lagoon area. Approximately 23,500 tons were hauled to the lagoon area and backfilled into the resultant excavation created by the subsequent remediation of Lagoon No. 5. The characterization of the "site soils" was an ongoing process and spanned several years as new areas of impacted materials were encountered as the Site remediation work proceeded. Completion of the "site soils" remediation efforts areas was achieved in late 2000 with the characterization and excavation of the Truckers' Parking Lot area and an area located adjacent to the East Tank Farm. The materials removed from these areas (an additional 3,500 tons) were hauled directly to the Lagoon No. 5 excavation.

Based on the results of chemical testing, only those "site soils" which contained carcinogenic PAH concentrations less than 97 mg/kg and arsenic less than 15 mg/kg were disposed off-site as non-hazardous solid waste at the Green Valley Landfill.

The coal overburden material (44,000 tons) was originally targeted for blending with the Lagoon No. 5 materials to enhance the heating value of the streams to be fed into the on-site incinerator. When it became apparent that the incineration remedy was to be eliminated (as per ROD Amendment 3), alternate handling/disposal methods were investigated. As a result, and following chemical and physical testing, these stockpiled materials were subsequently shipped (between July 1997 - April 1998) to cement kiln facilities owned by Southdown, Inc., and to power generation plants operated by Ohio Edison for consumption, as part of approved alternative fuels programs. Hard debris (brick and concrete), along with soft debris (wood, plastic, trash, etc.) were disposed off-site as non-hazardous solid waste at the Green Valley Landfill located in Ashland, Kentucky.

Similar to the coal overburden materials and "site soils," Lagoons No. 2 and 4 had surficial material that were initially characterized during the FS as having potentially beneficial fuel-grade BTU levels. Since Lagoon No. 5 material was no longer going to be incinerated, these "Type D" materials (17,700 tons) were screened to remove debris and then shipped (between September - November 1997) to power generation plants operated by Ohio Edison. The debris material was disposed of as non-hazardous solid waste at the Green Valley Landfill.

During the initial Site preparation activities, excavation work in the former area of the Coke Plant Ammonia Concentration building revealed the presence of soils emanating a petroleum-like odor and visual discoloration (green tinge). They were sampled in October 1995 and found to contain elevated levels of total petroleum hydrocarbons (TPHC). Remediation of the AC Building Soils, including excavation (approximately 6,000 tons), backfilling, and off-site disposal (as non-hazardous solid waste) at the Green Valley Landfill was completed in May 1997.

There were also seven localized soils areas within portions of the Coke Plant and Tar Plant identified during the RI/FS that indicated that these soils were impacted with contaminants above the ROD-specified soil clean-up levels and were additionally identified (as per the ROD) to be excavated and subjected to prepared-pad bioremediation. These soils areas were called the "ROD Soils" and were delineated as follows:

- ROD Soils Area 1 - south and southeast of Lagoon 1 and extending onto the Neal Junk Yard property;
- ROD Soils Area 2 - within the perimeter of the Coke Plant East Tank Farm;
- ROD Soils Area 3 - adjacent to the CPLA Administration Building and extending into the adjacent Truck Scale;
- ROD Soils Area 4 - west of the central portion of the former coke oven processing area;
- ROD Soils Area 5 - southern end of the Tar Plant and adjacent to Third Street;
- ROD Soils Area 6 - around the perimeter of the Tar Plant anthracene production facility;
- ROD Soils Area 7 - former Tar Plant waste loading area.

ROD Soils Area 4 was addressed first, and removed in 1995 as part of the Site preparation activities. The materials (2,600 tons) were stockpiled on-site in a lined, covered, and bermed area, to await construction and eventual treatment in the planned on-site prepared-pad bioremediation facility. However, in accordance with ROD Amendment #2, these soils were shipped off-site in late 1997 and disposed of as non-hazardous solid waste at the Green Valley Landfill.

ROD Soils Area 1 included private property (Neal Junkyard). A limited characterization of the Neal Junkyard was performed in 1992 as part of the Pre-Design field activities, with a three-phased focused characterization program subsequently performed in May 1996, September 1996, and January 1997. A multi-phased characterization program was also implemented on the Honeywell portion of the property in April, July, and October of 1997. Excavation to a depth of 10 feet was completed (as with the other ROD Soils Areas). Excavation began in late 1997 and was completed in May 1998, which included backfilling and regrading. Localized areas of contaminated soils within this portion of the Site were also addressed at this time, and were excavated (4,300 tons) and placed into the on-site stockpile to await placement into Lagoon No. 5.

ROD Soils Area 3 was characterized in April 1997 in conjunction with the field program for ROD Soils Area 1. 3,100 tons were excavated in early 1998 and disposed off-site at the Green Valley Landfill, and the areas backfilled and regraded. This work did not include the area that extended into the active Truck Scale facility. This portion was subsequently characterized in August 2001, with excavation of the materials (900 tons) and backfilling in September 2001.

Similarly, the removed materials from the latter activity were disposed off-site as non-hazardous solid waste at the Green Valley Landfill.

ROD Soils Area 5, 6, and 7 were fully characterized in April 1997. As per EPA and OEPA agreement, the characterization of the full lateral extent was not required at that time due to the ongoing Tar Plant operations, and was therefore restricted to encompass only the boundaries as identified in the ROD. The areas were excavated to a uniform 5-foot depth and backfilled between September and November 1998. The 4,700 tons of soil were disposed off-site as non-hazardous solid waste at the Green Valley Landfill. Characterization of the remaining soils will be performed as part of the new OU3 RI/FS work.

Additional remedial action/construction work at the Site included: installation of additional groundwater extraction wells, additional monitoring wells, modification of the on-site WWTP, floodwall slope restoration / east side of batteries remediation, and lagoon wetlands conversion program. This work was completed as follows:

- Between May and August 1996, a series of new groundwater pumping and monitoring wells were installed to support the groundwater migration control system. An additional pumping well was installed in November 1996.

- The modifications to the on-site WWTP were required to meet NPDES permit requirements and adequately treat groundwater from the Coke Plant, the Lagoon Area, and the Tar Plant. Modifications included an iron/suspended solids removal system (consisting of aeration/pH adjustment, clarification, and sand filtration), and a cyanide removal system (consisting of carbon towers). The modifications were completed in 1997 and formal system start-up occurred in June and July of 1997.

- The City of Ironton floodwall transects the Site in a north/south direction and was constructed by the USACE in the late 1930s, approximately 20 years after the start-up of the coke plant. Over the course of operations, soils, debris, and process materials (including coal and coke fines) accumulated in this area East of the Coke Plant Batteries and on the outer slope of the floodwall, extending in the direction of the Site that would eventually become the lagoon area. A preliminary work plan was prepared in March 1999 to cleanup this area of the Site. EPA and OEPA gave Honeywell approval to proceed and the work was initiated in April 1999. Coal and coke materials were scraped off down to the underlying visually clean soils and were then screened to removed trash, metal, and hard debris such as brick and concrete. The screened coal and coke materials (35,000 tons) were subjected to physical testing (BTU content) and then shipped off-site to the nearby Biomass facility (South Point, Ohio) for planned consumption as an alternative fuel.[1] Soft debris, including wood and other

[1]The materials that were shipped to the Biomass facility still remain stockpiled and have not yet been processed in accordance with the original contractual agreement between Honeywell and Biomass. These materials were designated to serve as feedstock to fire boilers located at the

miscellaneous materials were disposed off-site at the Green Valley Landfill. Metals debris was pressure-washed and shipped to a local scrap metal recycler. Hard debris, including brick and concrete, were pressure-washed and then chemically tested to confirm their suitability for on-site use in the lagoon area. These materials were stockpiled and used as rip-rap to provide erosion control in portions of the lagoon area. Hard tar (500 tons) was shipped off-site (with Lagoon No. 5 hard tar) for consumption as alternative fuel in the Piney Creek Light and Power Plant in Clarion, Pennsylvania. Material removal, regarding (including backfilling the top portion to the original grade as per USACE requirements), and revegetation of the floodwall slope were completed in late-1999/early-2000.

- Following the completion of the floodwall slope remediation and restoration activities, the March 1999 work plan was modified in March 2000 and June 2000 to reflect the work necessary for the East Side Batteries. In October 2000, Honeywell submitted an additional proposal requesting that the materials to be removed from the East Side Batteries area now be placed along the toe of the restored floodwall slope rather than being backfilled into Lagoon No. 5. Following EPA and OEPA approval, field characterization and sampling was initiated in January 2001. All of the removed material were stockpiled and chemically tested for carcinogenic PAHs and arsenic, and subjected to BTU testing. 63,900 tons with measured concentrations of carcinogenic PAHs less than 97 mg/kg and arsenic less than 15 mg/kg, and low BTU value were taken to the base of the floodwall slope. Placement started immediately adjacent to the northern side of the completed Lagoon No. 5 remediation area and proceeded northward to the existing property fence line. Materials that were found to contain acceptable fuel-grade BTU levels (4,800 tons) were shipped to Honeywell's Coke Plant facility in Detroit, Michigan for use in fuel-blending operations, and then ultimately processed as an alternative feedstock at the Tonawanda Coke Facility. Additionally, 3,800 tons of materials were shipped to Intermodal Corporation for use as part of the approved alternative fuels programs. Excavated coal and coke fines and soil materials with measured concentrations of carcinogenic PAHs greater than 97 mg/kg and/or arsenic greater than 15 mg/kg were disposed at the Green Valley Landfill. Honeywell also removed surface concrete slabs and demolished subsurface foundations to a depth of 4 feet below grade. Protruding sections of steel rebar were removed for shipment to a local scrap metal recycling facility. Below a depth of 4 feet, only concrete and brick with carcinogenic PAHs less than 97 mg/kg and arsenic less than 15 mg/kg were used as basement foundation backfill. From a depth of 4 feet to the surface, concrete, brick, and other soil materials with carcinogenic PAHs less than 97 mg/kg and arsenic less than 15 mg/kg were used to back fill foundations. The area was

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Biomass facility; however, the boilers and power generation components have not been constructed to date. The un-processed materials are currently stored inside a concrete building with a concrete floor. However, the building's roof is not intact, and the walls of the building are not fully intact. The material is subject to wind erosion, and precipitation. OEPA has attempted enforcement actions against the owner of the Biomass facility, Mark Harris. Mr. Harris has not complied with OEPA and this issue remains to be resolved. EPA will be working with Honeywell and Biomass to resolve this problem (Photographs 3 through 8).

collectively regraded to provide for acceptable stormwater drainage. Regrading was done in a way to separate property parcels to allow for certain portions to be sold and re-used.

- Construction of the in-situ bioremediation system began in July 1996. Due to difficulties with the excavation process (trenches could not be held open using a bio-polymer slurry, unanticipated boulders and construction debris), Honeywell requested temporary cessation of the work in August 1996 and submitted a petition for EPA review of the lagoon area remedy. ROD Amendment No. 3 reflects the change in the lagoon area remedy. In-situ bioremediation in Lagoon Nos. 1 - 4 was replaced with hot spot-excavation of isolated highly-contaminated areas and conversion of the lagoon area into a wetland ecosystem. In support of this change, a detailed Lagoon Materials Delineation Program was performed in April and May of 1997 to provide sufficient analytical data for statistical evaluation of the overall average concentration of carcinogenic PAHs that would remain in the Lagoon area. EPA also required an ecological assessment of the lagoon area to gather sufficient information to characterize the condition of the existing benthic invertebrate and vegetative communities, ad to evaluate potential impacts to the species with respect to the measured carcinogenic PAH levels in the lagoon materials. The field and laboratory testing was conducted between September and November 1997, with the results presented in the Reconnaissance Ecological Risk Assessment Report, dated January 1998 and revised in July 1998 and March 1999. The principal conclusions indicated that the residual levels would not significantly impact the successful establishment of the planned wetland ecosystem with regard to both aquatic and vegetative communities. Based upon EPA and OEPA approval of the Risk Assessment Report, Honeywell submitted the Wetlands/Floodplain Conversion Plan in September 2000 which required: construction of an overflow weir adjacent to Lagoon 4 and placement of rip-rap; permanent modification of the sluice gate adjacent to Lagoon 3 to permit complete hydraulic connection with Ice Creek which allows for equalized inflow/outflow during flood events; and adoption of an annual monitoring program to evaluate the re-establishment of vegetation and to assess the condition of the biological community. The construction of the erosion control measures have been completed and the first annual monitoring program was conducted in July 2002. The second monitoring event occurred in July 2003, and the third event occurred in July 2004.

- The Lagoon No. 5 remediation was also revised pursuant to ROD Amendment 3. The supporting documentation included an additional investigation program performed on Lagoon 5 materials in May/June 1997. The contract for remediation of Lagoon 2 and 5 was awarded in March 1998. Field work started in August 1998. Excavation was completed in July 1999 with the removal of approximately 120,000 tons. The coal/coke fines (85,600 tons) and segregated hard tar (16,000 tons) were shipped off-site to multiple outlets for consumption as part of approved alternative fuels programs. Specifically, the coal/coke fines were shipped to: Allegheny Power, Rurkola, Ohio Edison, Louisville Gas and Electric, Cincinnati Gas and Electric, Dayton Power and Light, and the Biomass facility. The hard tar was shipped to the Illinova Resource Recovery Facility and the Piney Creek Light and Power Plant. The soft tar materials were KO87 listed wastes and were planned to be shipped to

available coke plant facilities, but, due to acceptance criteria, the other plants would not accept these 7,100 tons. They were therefore transported to Safety-Kleen Landfill in Sarnia, Ontario for proper disposal. 500 tons did pass the acceptance criteria and was exempted as KO87 waste and was sent to Citizens Gas and Coke for use as an alternative feedstock. Work at Lagoon 5 was completed in October 1999 with final seeding.

- Concurrent with Lagoon 5 work, excavation of Lagoon 2 hot-spots was initiated in November 1998. This work was completed in June 1999, with the total quantity of materials removed estimated at 9,500 tons (8,300 tons of hard tar and 1,200 tons of coal/coke fines). The hard tar was shipped to Illinova Resource Recovery Facility for the alternate fuels program and the coal/coke fines were blended with the fines from Lagoon 5 and shipped to the various power plant facilities. 2,000 tons of clean (PAHs < 97 mg/kg and arsenic <15 mg/kg) material were placed in Lagoon 2. Backfilling of Lagoon 2 was completed in October 2000 with the final placement of a six-inch layer of imported fill materials over the entire excavation.

TABULATED REMEDIATION SUMMARY

AREA / MATERIAL	APPROXIMATE QUANTITY (TONS)	HANDLING / DISPOSAL
Coal Overburden	44,400	Southdown Cement Kiln and Ohio Edison (alternative fuel)
Surface of Lagoons 2 and 4 ("Type D" Material)	17,700	Ohio Edison (alternative fuel)
"Site Soils" Stockpile Truckers Parking Lot / East Tank Farm Reject	 23,400 3,500 3,700	 Lagoon 5 backfill Lagoon 5 backfill Green Valley Municipal Landfill
Crusher Fines	12,000	Lagoon 5 backfill
AC Building Soils	6,000	Green Valley Municipal Landfill
ROD Soils Areas	28,500	Green Valley Municipal Landfill
Floodwall Slope Coal / Coke Fines Hard Tar	35,000 500	Biomass Piney Creek Power Plant (alternative fuel)

AREA / MATERIAL	APPROXIMATE QUANTITY (TONS)	HANDLING / DISPOSAL
East Side Batteries & Area above floodwall	63,900	Backfill along toe of floodwall slope
Coal & Coke Fines	3,800	Intermodal Corp. (alternative fuel)
Coal & Coke Fines	4,800	Honeywell's Detroit Coke Plant (fuel blending) & processed at Tonawanda Coke (alternative feedstock)
Lagoon 5		
Coal & Coke Fines	21,900	Biomass
Coal & Coke Fines	1,200	Allegheny Power (alternative fuel)
Coal & Coke Fines	2,200	Ruhrkola (alternative fuel)
Coal & Coke Fines	26,700	Ohio Edison (alternative fuel)
Coal & Coke Fines	15,900	Louisville Gas & Electric (alternative fuel)
Coal & Coke Fines	14,100	Cincinnati Gas & Electric (alternative fuel)
Coal & Coke Fines	3,600	Dayton Power & Light (alternative fuel)
Hard Tar	16,000	Illinova Resource Recovery /Piney Creek Power Plant (alternative fuel)
K087 Soft Tar	7,100	Safety-Kleen Landfill - Sarnia Ontario
Exempted Soft Tar	500	Citizens Gas & Coke (alternative feedstock)
Soft & Hard Debris	10,800	Green Valley Municipal Landfill
"Clean" Clay	2,000	Lagoon 2 Backfill
Tarry Soils	11,800	Southdown Cement Kiln (alternative feedstock)
Hard Tar	100	Illinova Resource Recovery (alternative fuel)
Lagoon 2 "Hot Spots"		
Hard Tar	8,300	Illinova Resource Recovery (alternative fuel)
Coal/Coke Fines	1,200	Power Plants as per Lagoon 5 (alternative fuel)
Debris (excluding Lagoon 5)		
Hard Debris (brick and concrete)	13,100	Green Valley Municipal Landfill
Soft Debris (wood, plastic, trash, etc.)	500	Green Valley Municipal Landfill
Scrap Metal	900	Mansbach Recycling Facility

Operation and Maintenance (O&M)

O&M activities at the Site are extensive and include activities associated with groundwater/wastewater operations, monitoring systems, engineered structure maintenance, landscaping, and security. The categories are further delineated in the following table.

Cost Item	1999	2000	2001	2002	2003
On-Site Labor	$842,000	$842,000	$842,000	$809,000	$678,000
Utilities	$140,000	$140,000	$140,000	$140,000	$140,000
Permits	$ 12,400	$ 12,400	$ 12,400	$ 12,400	$ 12,400
Carbon and chemicals for WWTP	$141,300	$141,300	$141,300	$141,300	$141,300
Filter Cake Disposal	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200
WWTP analytical	$180,400	$180,400	$180,400	$180,400	$180,400
Site Security	$ 68,200	$ 68,200	$ 68,200	$ 68,200	$ 68,200
Site Maintenance	$163,900	$163,900	$163,900	$163,900	$163,900
Administrative	$121,600	$121,600	$121,600	$121,600	$121,600
CPLA and Ice Creek Monitoring	$ 42,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000
CPLA and Ice Creek Reporting	$ 15,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000
Wetlands Survey and Monitoring	0	0	0	$ 25,000	$ 25,000
CPLA Pumping System Support	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000

Cost Item	1999	2000	2001	2002	2003
Pumping Well Replacement	0	0	$ 50,000	$ 50,000	0
GDA Monitoring	$ 23,000	$ 23,000	$ 23,000	$ 21,000	$ 21,000
GDA Reporting	$ 17,000	$ 17,000	$ 17,000	$ 16,000	$ 16,000
GDA Pumping System Support	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
GDA NAPS Technology Assessment	$ 5,000	$ 5,000	$ 5,000	$ 5,000	0
Laboratory Analytical Services	$ 83,000	$ 71,000	$ 75,000	$ 73,000	$ 71,000
Taxes	$ 13,000	$ 13,000	$ 13,000	$ 13,000	$ 13,000
ANNUAL TOTALS (rounded)	**$1.9 million**	**$1.9 million**	**$1.95 million**	**$1.9 million**	**$1.7 million**

Additional O&M information is broken down by Site areas:

CPLA

The 37-acre area known as the "uplands" part of the Coke Plant has been completely remediated as of October 2001. Commensurate with the Brownfields sale of this parcel to the City of Ironton in August 2002, O&M activities that had been performed by Honeywell are now being undertaken by the City of Ironton. These O&M activities include: mowing and grounds keeping of the grassed portions, and the monitoring and operation of the Stormwater Retention Pond.

The former CPLA Administration Building is currently unoccupied, but still serves as an equipment storehouse and workshop area. The adjacent WWTP and East Tank Farm facilitate the ongoing collection and treatment of Site groundwater and is staffed by control room operators and maintenance personnel. A chain-link fence (including posted warning signs), which is maintained by Honeywell, secures the entire perimeter of the "uplands" area and the lagoon area.

The lagoon area extends to the western edge of the East Side of Batteries area (including the Ironton Floodwall). This entire property will be retained by Honeywell. Remedial actions were completed in this area in October 2001, with the final placement of the excavated East Side Batteries materials along the toe of the Floodwall Slope. As required by the ROD Amendment 3, the future maintenance of the lagoon area includes annual assessments to determine that the residual materials left in the lagoons do not pose unacceptable risks to the biological and vegetative communities. These assessments require sample collection, laboratory analysis, and field evaluations to document the development of the wetland system and assess the health of the ecosystem and benthic macroinvertebrates.

Other routine O&M activities that are performed in the lagoon area include periodic inspection and repair of the perimeter fence and the outer dike wall that separates the lagoons from adjacent Ice Creek, as well as other locations that are susceptible to potential erosional effects caused by occasional flooding of the area. To minimize these concerns and to afford more controlled ingress/regress of flood waters, an overflow weir was constructed adjacent to Lagoon 4, and the sluice gate adjacent to Lagoon 3 has been permanently opened. Following flood events, any debris that may accumulate is removed so that future flood water inflows/outflows remain unobstructed. In addition, two flood water sampling events were planned and implemented.

O&M activities were initiated in 2002 for the restored Floodwall Slope and included reseeding the face of the slope, following patches made to areas initially observed as being impacted by erosion. These areas were patched using imported fill materials. Honeywell continues quarterly inspections of the Floodwall Slope and makes repairs as needed. Honeywell has recently installed additional vegetation test patches to determine the best type of vegetation to place on the wall to minimize future erosional impacts and to enhance the aesthetics of the area (Photograph 9).

OEPA also performed an O&M Inspection of the CPLA on June 10, 2004. The floodwall slope, upon which a significant quantity of coal/coke/soil materials were placed as part of the remedy, must maintain structural as well as erosional stability. The inspection did not indicate any areas at which structural stability appeared to be in question. At several locations, relatively small erosional channels were observed, but, in most cases, these channels did not appear to be enlarging or deepening substantially. The overall vegetative cover on the floodwall embankment appeared to be in good condition. Several vegetative test plots were inspected and most locations showed some positive qualities of vegetative growth. However, most locations also appeared to show a negative effect of flood water encroachment to a specific elevation on the embankment, with the exception of the honeysuckle plot. Honeywell will be providing recommendations for full scale implementation of new revegetation efforts (based on the test plots) in the fall of 2004. Subsequently, the floodwall will be revegetated with the plants that have been tested on-site and shown to provide the best growth and coverage. In the lagoon area, the inspection showed that qualitatively, the wetland ecosystems appear to be continuing their evolution in a positive fashion. A quantitative analysis of the ecosystem is part of a long-term monitoring program, that began with a reconnaissance-level ecological assessment in late-1997, followed by the Lagoon

Area Wetlands/Floodplain Conversion Plan in September 2000, and performance of annual ecological/ wetlands monitoring (which began in July 2002).

Based on the results of the 2002 and 2003 assessments, the development of a stable wetland plant community in the lagoon areas is proceeding. The vegetative cover was observed to be significantly high in all of the lagoon sampling areas, and most species were adapted to wetland conditions. The development of a stable benthic macro-invertebrate community in the lagoon areas is also proceeding. Organisms with low taxa tolerance values (highly sensitive to organic pollution) were observed. However, the observed absence of the more-sensitive Lumbriculids (ultraviolet light/PAH sensitive aquatic worms) still maintains a level of uncertainty relative to potential impacts of ultraviolet light-enhanced phototoxicity of PAHs. However, such organisms are also only present in very low numbers in the reference areas (only one was found). Water chemistry parameters, as well as grain size, were comparable between the reference areas and lagoon areas. Refer to photographs 10 through 13 concerning the wetlands revegetation program.

The success of the lagoon area remediation will be measured over the next few years. O&M for the wetlands habitat is actually performed by natural processes. It is hoped that the ecosystem will be restored and success will be achieved when it contains sufficient biotic and abiotic resources to continue its development without any further assistance. It should contain a characteristic assemblage of the species that occur in the reference area, it will contain an appropriate community structure, it will consist of indigenous species to the greatest practicable extent, and it will contain all functional groups necessary for the continued development and stability of the system. It will also sustain reproducing populations, and will be resilient to endure the normal periodic stress events in the local environment.

Groundwater Pumping, Treatment, and Monitoring

A site-wide pumping, treatment, and monitoring system is in operation which addresses the GDA, CPLA, and the Tar Plant area, OU3. Map 3 shows the site-wide groundwater contours and effectiveness of the system (inward gradient within the property boundaries).

The CPLA groundwater collection and treatment system has operated continuously since its start-up in August 1997, and provides for containment of site-impacted groundwater and treatment in the on-site WWTP. Treated groundwater is then discharged to the Ohio River through NPDES-permitted outfalls. The pumping wells that comprise the groundwater collection network include four lagoon area wells (WE-2401, WE-2425, WE-2427, and WE-2428), and two Tar Plant area wells (WE-618 and WE-1800). Evaluation of progress towards achievement of the established Site groundwater cleanup standards is accomplished through quarterly performance of the CPLA Compliance Monitoring program, ongoing since 1997. Presently, this program entails groundwater sample collection from eight wells located around the downgradient perimeter of the CPLA, including lagoon areas wells WE-2425, WE-2427, WE-2428, and MW-23, and Tar Plant area wells MW-11, MW-17, MW-24, and MW-27. The field and laboratory results from the groundwater monitoring program are presented in the quarterly monitoring reports submitted to EPA and OEPA. The data includes chemical analysis as well as potentiometric data.

The reports received and reviewed since the last Five Year Review (1999) indicate that the groundwater containment system continues to function effectively, and contaminant concentrations have remained at or near previous levels.

Extraction well WE-618 was constructed for removal of separate-phase materials. Approximately 1,900 gallons of separate-phase material have been removed as of September 2003. In addition to the monthly reporting of the amount of separate-phase material removed from WE-618 at the Tar Plant, a monthly monitoring program (with quarterly reporting) for the presence of Non Aqueous Phase Substances (NAPS) of six wells in the vicinity of the GDA is also ongoing.

On an as-needed basis, maintenance of the extraction wells includes removal and cleaning of the pumps and discharge piping, along with routine inspections of other mechanical and electrical components. Continual injection of sodium hypochlorite into pumping well WE-618 is also performed to minimize the potential effects of iron fouling within the well.

Within the WWTP, typical O&M activities include periodic cleaning of the sand filter, change-out of carbon beds, and packaging and disposal of filter cake materials. Overall operations of the pumping wells and the WWTP processes are continuously monitored from a central control room, with daily logs prepared to document operational parameters such as groundwater flow rates, system pressures, alarm warnings, and maintenance performed.

In order to monitor the performance of the on-site WWTP in removing contaminants from the pumped groundwater and to demonstrate compliance with the established NPDES discharge limits, samples are collected at selected process points and at outfalls internal and external to the WWTP (Photograph 14). As required by the in-place NPDES permit, samples are collected at the specified frequencies with analytical results compared to allowable daily maximum and monthly average values. On a monthly basis, a summary report is submitted to the State of Ohio to document measured concentrations of each monitored parameter with respect to the established permit limits. Within the report, any excursions above the established limits are noted, and as necessary, proposed plans for further investigation and/or corrective actions are outlined.

The performance of the pumping system relative to its effectiveness in controlling the potential migration of site-impacted groundwater is evaluated through the monthly collection of site-wide groundwater levels. These water levels are used to construct groundwater contour maps from which an assessment is made of the estimated limits of groundwater capture. On a quarterly basis, the results of these assessments are presented in the monitoring reports. In conjunction with the monthly water level collection, the above-grade portion of each of the Site monitoring wells is inspected and repairs made, as necessary, to preserve their integrity.

The required duration of groundwater pumping and treatment is uncertain, but currently estimated to require at least another twenty years of operation. The ROD contemplated at least thirty years of groundwater extraction and treatment to achieve the cleanup standards. However, the analytical results compiled to date do provide evidence of improving groundwater quality.

Specifically, within the northern portion of the lagoon area (near pumping wells WE-2425 and WE-2427), measured concentrations of all monitored parameters are currently below the established Site cleanup goals. Beginning in August 2002, the groundwater pumped from these two wells is being discharged directly to the Ohio River without treatment in accordance with NPDES Permit No. 0IF00014*KD.

Groundwater Cleanup Standards:

Contaminant	Cleanup Standard
Benzo(a)pyrene	200 ppt
Dibenz(a,h)anthracene	300 ppt
Arsenic	50 ppb
Ammonia	30 ppm
Phenolics	4 ppm
Benzene	5 ppb
Naphthalene	300 ppb
Nitrate	10 ppm
Total Cyanide	200 ppb

ppt parts per trillion
ppb parts per billion
ppm parts per million

Data from the southern portion of the lagoon area (near wells WE-2401, WE-2428, and MW-23) shows localized and elevated concentrations of benzene and ammonia. Similarly, groundwater quality in the Tar Plant area (near MW-24) presently shows only carcinogenic PAHs to be above the established Site cleanup goals. Results from periodic sampling of the Tar Plant pumping well WE-1800 shows low levels of PAHs and elevated levels of benzene. Tar Plant pumping well WE-618 has low levels of PAHs and VOCs. In addition, separate-phase materials were found in former pumping well WE-617 (located adjacent to WE-618) in February 2000. WE-618 was constructed for removal of separate-phase materials. Approximately 1,900 gallons of separate-phase material have been removed as of September 2003. In addition to the monthly reporting of the amount of separate-phase material removed from WE-618 at the Tar Plant, a monthly monitoring program (with quarterly reporting) for the presence of Non Aqueous Phase Substances (NAPS) of six wells in the vicinity of the GDA is also ongoing.

The ongoing groundwater collection and treatment operations will continue for the indefinite future until such time as the measure groundwater quality meets the established Site cleanup

goals. As such the monitoring programs will also continue throughout this period. At such a time when such operations are terminated, the requirements for post-operational monitoring will be implemented (which will confirm the success of the remediation program).

Ice Creek

The Ice Creek Monitoring/Contingency Plan was prepared in December 1992 resulting in the installation of monitoring wells ICMW1 - ICMW-5 in early 1993 to be used for detecting potential contaminant migration towards the Coal Grove well field. In October 1993, quarterly sampling of these wells was initiated. This program also included monitoring Coal Grove pumping wells, numbers CG-3 and CG-4, other on-site monitoring wells, MW-5, MW-7, and MW-10, and two surface water locations within Ice Creek. In 2000, this monitoring program was reduced to a semi-annual basis. To date, evaluation of the analytical results has indicated no degradation of the Ice Creek surface water or the Coal Grove water qualities. This activity will continue for the indefinite future in conjunction with the Site groundwater pumping operations and the CPLA Compliance Monitoring Program.

GDA

Quarterly progress reports have been submitted on the GDA since 1995. The quarterly reports address the RD/RA Monitoring Plan which includes groundwater monitoring for water levels and quality, gas monitoring at the Site cap vents, and NAPS monitoring for migration analysis. In addition the reports provide a summary of water pumped from the GDA that was treated and discharged. Specifics of the quarterly reports include groundwater monitoring for water levels and quality. Water levels are measured to monitor the progress of the groundwater extraction process in its ability to achieve the desired inward gradient across the containment barrier, such that the groundwater elevations within the containment is lower than the water table outside. Except for a few fluctuations due to flooding events and maintenance or temporary shutdown of an extraction well, groundwater levels have been consistently lower inside the slurry wall than outside the slurry wall. A positive gradient, indicating flow from outside to inside has also been maintained. Fortunately, the fluctuations that have occurred have been concentrated in the northwest corner of the GDA where any outflow can be captured by another extraction well located outside the slurry wall.

Groundwater quality is also measured inside and outside of the GDA. This monitoring provides information on overall groundwater quality as well as the effectiveness of the pumping and containment system. All groundwater samples are analyzed for BTEX, PAHs, TPHC, pH, total and amenable cyanide, total phenols, ammonia, and arsenic. The parameter of free cyanide is also included for the extraction wells because it is a monitoring parameter at the internal outfalls in the WWTP where the water is eventually discharged.

As part of the groundwater level measurements, specific wells are also checked for the presence of NAPS (free product). In addition, samples are collected from two monitoring wells and specifically analyzed to determine the presence or contribution of NAPS to contamination in the well. Groundwater samples from the two NAPS monitoring wells are analyzed for BTEX, PAHs, TPHC, pH, total and amenable cyanide, total phenols, ammonia, and arsenic. Throughout the quarterly monitoring, variable levels of VOCs and PAHs have been detected, while levels of inorganics and ammonia have remained relatively constant.

Honeywell, as required by the U.S. EPA and Ohio EPA, reviewed and evaluated emerging technologies which may be potentially applicable in addressing the NAPS outside the limits of the GDA slurry wall. Pertinent information from the previous reviews (extending back to 1996) is included in the document. As of the 2002 review of NAPS remediation technologies, generally none of them are applicable to the GDA. The migration of dissolved-phase constituents associated with the NAPS plume is controlled by a groundwater extraction system. Based on field and laboratory tests, the NAPS materials are estimated to have a specific gravity of approximately 2.6 and an estimated hydraulic conductivity in the range of 5×10^{-4} to 5×10^{-5} centimeters per second. The overlying alluvial materials have an estimated hydraulic conductivity of approximately 1×10^{-1} centimeters per second. The NAPS materials are relatively insoluble and immobile, comprised principally of semi-volatile and volatile organic compounds. The impact of NAPS on groundwater quality in locations where NAPS have been detected appears to be limited to 2 to 3 feet above the NAPS layer. Technologies considered included in-situ bioremediation; soil flushing with steam, air, surfactants, and cosolvents; chemical oxidation; slurry/sheet pile wall; dynamic underground stripping (DUS) and hydrous pyrolysis/oxidation (HPO); injecting brine and surfactants; pulsed injection of ozone; and pressure pulse technology.

OEPA conducted an O&M inspection at the GDA on June 10, 2004. In general, the O&M inspection indicated that all basic landfill components are in good condition and functioning as intended. The cap was found to be in good condition, well vegetated[2], and there was no evidence of settlement or rodent burrowing. All gas vents contained the appropriate screens and continue to be stable. All access roadways were in generally good condition. No evidence of ponding or excessive sediment deposition was observed in the surface water runoff ditches. The landfill perimeter was examined, with no breaches to the perimeter fence observed[3]. All security signs and gate locks were in place as required. Pumping well PW-4 is currently the only well being pumped inside the slurry wall, and was pumping at 10 gpm at the time of the inspection. PW-3 has been in temporary shutdown mode since August 1998. As evidenced by the quarterly

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[2]Some medium sized shrubs/trees had encroached upon the perimeter fence adjacent to the railroad property and was observed in June 2003. This vegetation was removed by the time of the 5 Year Review inspection in July 2004.

[3]Vehicle damage to the fence adjacent to the VFW property, that was observed during the June inspection, had been fixed by the time of the 5 Year Review inspection in July 2004.

monitoring reports, the rate maintained by PW-4 has been effective in maintaining the required inward hydraulic gradient at the GDA. During the July 2004 inspection, the same pumping rate was observed. Refer to Photographs 15 and 16 to view the condition of the GDA.

V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the second Five-Year Review for the Site. The protectiveness statement from the Five-Year Review conducted in 1999 stated: "EPA certifies that the remedy selected for the Site remains protective of human health and the environment." It recommended continued monitoring and maintenance of the Site to ensure that the RODs' requirements are met. A copy of the 1999 Five-Year Review is included in Appendix 3.

Since completion of the 1999 Five Year Review, the following has been accomplished at the Site:

- 37-acres of the upland portion of the Coke Plant has been transferred to the City of Ironton (August 2002) and ultimately transferred to the State of Ohio Department of Transportation (ODOT) for its maintenance facilities. As of July 2004, ODOT has almost completed building its facilities.

- In October 2001, final placement of the excavated East Side Batteries materials was completed along the toe of the floodwall slope;

- In July 2002, annual wetland assessments were initiated as part of the CPLA O&M program;

- In 2002, Floodwall Slope O&M activities were initiated and include revegetation work;

- In December 2002, the Tar Plant was closed by Honeywell and ceased operating.

- The demolition of the Tar Plant structures was completed in early October 2003;

- By December 2003, tank bottoms from the East Tank Farm were cleaned out, waste material residues were removed from subsurface stormwater trenches, storage pads, and tank pads and disposed off-site, underground process and utility piping were removed through excavation of a series of trenches. During the course of these activities, samples of near-surface soil materials (typically no deeper than 5 feet) were collected from each of the thirteen (13) trenches and submitted for analysis of PAHs and arsenic. The analytical results for the composites samples collected from within the limits of this ROD Soils area do show measurable levels of PAH contamination. Following the removal of the underground piping, the trenches were backfilled with the existing materials excavated from the trenches;

- In 2001, Honeywell submitted a groundwater pumping system evaluation report to address issues brought up by EPA and OEPA during the 1999 Five Year Review (optimization of the

groundwater contaminant capture system). The conclusion derived from the groundwater pumping system evaluation was that persistent lowering of the groundwater over the previous few years was indicative of the groundwater extraction rate being greater than required for capture and could be reduced. The report included a proposal for a new pumping scheme and a monitoring program and an implementation plan if the groundwater levels begin to rise (short term due to extended wet weather or long term due to changed conditions);

- In March 2002, as approved by EPA and OEPA, the groundwater pumping system was adjusted to optimize the groundwater containment system;

- Honeywell has been submitting annual reviews of the NAPS remediation technologies;

- Honeywell has implemented a focused remediation effort involving DNAPL recovery via a dedicated pumping system installed in Tar Plant pumping well WE-618 (initiated in September 2001); and

- Honeywell signed an AOC with EPA for performance of an RI/FS on the Tar Plant area in August 2003 (the previous work performed for the Tar Plant was performed in accordance with State of Ohio Cessation of Regulated Operations regulations). Honeywell submitted an RI/FS Work Plan for the Tar Plant in February 2004 and is expected to begin RI/FS field work for the Tar Plant by October 2004.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

The EPA Remedial Project Manager (RPM), Sharon Jaffess, notified Ohio EPA and the PRP's Project Coordinator (Richard Galloway, Honeywell) of the initiation of the five-year review process in the winter of 2004. The EPA RPM headed the five-year review team, and was assisted by Ohio EPA (primary contact for the review is Kevin O'Hara.). Kevin O'Hara also conducted an O&M inspection at the Site in June 2004, which covered many of the same elements as this review.

The review schedule included the following components:

- Community Notification;
- Document Review;
- Data Review;
- Site Inspection;
- Interviews; and
- Five-Year Review Report Development and Review.

Community Involvement

In February 2004, the RPM discussed the need to notify the community that the five-year review process was underway with the EPA Community Involvement Coordinator (CIC), Zenny Sadlon. In June, 2004, the EPA Office of Public Affairs placed an ad in the local newspapers announcing that the Five-Year Review was in progress and requesting that any interested parties contact EPA for more information. A copy of the ad is in Appendix 3. Since the ad was issued, no member of the community has voiced an interest in the Five-Year Review.

Document Review

This Five-Year Review consisted of a review of relevant documents including: Ironton Coke Plant Site Groundwater Monitoring Reports (First Quarter 2002, Second Quarter 2002, Third Quarter 2002, Fourth Quarter 2002, First Quarter 2003, Second Quarter 2003, Third Quarter 2003, Fourth Quarter 2003, First Quarter 2004); Ironton Coke Plant Site Lagoon Area Vegetation and Benthic Macroinvertebrate Monitoring Report (October 2002); Groundwater Pumping System Evaluation Summary Report (August 2001); CPLA/GDA Groundwater Modeling and Capture Zone Analysis (March 1999); Tar Plant Site Management Plan (March 2001); Wastewater Treatment Facility Operating Manual (1992); Separate-Phase Materials Evaluation Program (January 2001); CPLA Groundwater Collection and Treatment System Remedial Action Implementation Plan (July 1996); Monthly Reports (January 2000 - July 2004); Supplemental Ice Creek Monitoring Sampling Reports (2003); February 2003 Flood water Sample Report (March 25, 2003); Lagoon Area Wetlands/Floodplain Conversion Plan (September 2000); Report of Slope Stability Analysis (February 12, 2002); GDA Updated Air Emissions Evaluation (March 2002); Reconnaissance Ecological Risk Assessment (March 1999); Record of Decision (9/29/88); Record of Decision (12/28/90); Record of Decision Amendment #1 (7/31/95); Record of Decision Amendment #2 (9/4/97); Record of Decision Amendment #3 (9/30/98); Unilateral Administrative Order V-W-89-C-007 (3/9/89); Administrative Order on Consent V-W-03-C-755 (8/22/03); Division Survey Plat of Tracts 1,2,3,4,& 5 (Volume 492, Page 681 Lawrence County Recorder's Office).

Data Review

GDA

Since pumping operations began in late 1995, approximately 606.1 million gallons of groundwater have been extracted from outside and within the GDA. The system continues to operate and provide the necessary drawdown to maintain the inward hydraulic gradient. It should be noted, however, that in August 2003, significant modification was made to the pumping system: PW-2 was shut down and the PW-1A pumping rate was increased to 115 gpm. This change was made because of the optimization study previously discussed. In order to help in the evaluation of the effectiveness of the system, Honeywell was tasked to prepare monthly groundwater contour maps, based on the monthly measurements of the potentiometric data. From September to November 2003, there was a visible decreased extent of the capture zone north of PW-2. It was hypothesized that the problem could be related to the precipitation rate.

As suggested by OEPA's hydrogeologist, Honeywell was asked to reevaluate the system and rates. This re-evaluation resulted in the development of a proposal to increase the pumping rate at PW-1A by 20% (up to 145 gpm) and the re-establishment of pumping at PW-2 at a target rate of 20 gpm.

Unfortunately, PW-1A could not pump at a rate of 145 gpm. Due to observations concerning the build-up of scale (iron bacteria), Honeywell contracted with Mole Master to perform cleaning of the pumps and lines. These cleaning activities occurred between April 13 and 29, 2004. PW-1A and PW-2 pumping operations resumed with target pumping rates of 145 gpm and 20 gpm, respectively. The target rate for PW-1A represents an increase over the former rate of 115 gpm (prior to line cleaning). Based on a May 2004 groundwater capture zone map, EPA and OEPA have instructed Honeywell to increase the pumping rate at PW-1A to 175 gpm and shut down PW-2. Based on monitoring between July and August, EPA and OEPA may require Honeywell to install a replacement well for PW-2, which will be capable of extracting more than 20 gpm and ensuring adequate groundwater capture conditions north of PW-2.

Thirty-two wells are utilized for potentiometric level measurement. It is demonstrated by this program that there is a positive gradient maintained (any leakage flows into the GDA containment system, and then it is subsequently pumped out by the extraction well).

Thirteen wells inside and outside of the slurry wall are part of the groundwater quality monitoring program. The wells are analyzed for PAHs, BTEX, arsenic, ammonia, total cyanide, amenable cyanide, TPHC, phenolics, and pH. MW-29, located on the Transmar Coal Property, off-site, continued to show non-detections, except for low levels of ammonia and PAHs. Also, off-site wells at Ironton Iron continue to show very near or below non-detect levels, with the exception of cyanide. Pumping wells inside the slurry wall, from 1995 through 2004, show a generally constant level of PAHs, benzene, ammonia, and cyanide. Pumping wells outside of the slurry wall also show a generally constant trend. The monitoring wells show highly variable levels of PAHs, benzene, and ammonia, but very steady to declining trends for cyanide.

NAPS and Separate Phase Materials

Specific wells are checked for these non-aqueous phase substances (free product or NAPS) which are known to be not entirely contained within the GDA slurry wall.

NAPS monitoring was originally planned to be conducted on a quarterly frequency; however, since these wells are also included in the potentiometric measurement program, they are monitored on the same monthly frequency.

Historically, the presence of NAPS had been determined by combined usage of the Flexidip/Ullage Interface Probe, and collection of well-bottom samples via a stainless-steel cup attached to a length of conduit. A revised monitoring procedure was developed in August 2000 that eliminated use of the probe, which was found to only be suitable for LNAPL, not DNAPL.

The most recent data continue to indicate consistent detections of NAPS only in GDA well NMW-1A.

Beginning in September 2001, pumping and collection of DNAPL from WE-618 was initiated. As of the end of June 2004, a total of approximately 2,472.5 gallons of DNAPL has been removed and collected from WE-618. Since the start of this DNAPL pumping, the collected materials (characterized as non-hazardous) have historically been shipped to Honeywell's Detroit Tar Facility for recycling. However, beginning in the Third Quarter of 2004, and due to the recent shutdown of the Detroit facility, the materials will now be managed as part of approved off-site fuels blending programs.

CPLA

Samples of groundwater are collected at 8 locations within the CPLA as part of the quarterly program. Analysis is conducted for PAHs, volatile organics, arsenic, ammonia, cyanide, nitrate, and phenolics. Groundwater quality in and around the lagoon area continues to show benzene levels above the clean up standard and ammonia levels very near the clean up standard, particularly in the southern portions of the lagoon area. Although elevated, benzene concentrations are showing a downward trend. The groundwater quality at the northern end of the lagoon area (WE-24225 and WE-2427) remains below the cleanup standards since August 2002.

Tar Plant

While not the subject of this five year review, wells in the Tar Plant area are included in the site-wide monitoring program. There appears to be acceptable water quality for all parameters, with the continuing exception of PAH_c in well MW-24. The level, however, represents an order of magnitude decline from the all-time high level reported in 2003, and may represent progress towards anticipated improvements in groundwater quality from the April 2003 clean-out and wellhead modifications.

Ice Creek

Eight wells are sampled on-site and two Coal Grove pumping wells are sampled. In addition, surface water samples are collected from two locations in the creek. Samples are collected for PAHs, volatile organic compounds, arsenic, ammonia, cyanide, nitrate, and phenolics.

There have been no exceedences to the cleanup levels in any of the wells.

Site-Wide Groundwater Containment

As per EPA and OEPA approval in January 2002, the first incremental adjustments to the site-wide pumping system were made on March 8, 2002. The total site-wide extraction rate is presently up to 380 gpm as compared to pre-adjustment rate of approximately 400 gpm. The effects of the March 2002 pumping rate adjustment have been continuously evaluated. In

October 2002 (following six months of operation), it was observed that adequate capture of site-impacted groundwater was being maintained, although certain areas between the GDA and the Ohio River continued to show a somewhat protracted capture zone as compared to prior to March 2002. These reduced capture conditions were believed attributable to residual accumulation of groundwater within the aquifer resulting from increased precipitation during the months of March - May 2002 (7" above normal levels). The October 2002 capture zone did show improvement. Based on January 8, 2003 field data, it was observed that the site-wide potentiometric surfaces rebounded slightly from October 2002, showing an average increase of 0.5 foot. This trend continued into April 2003, which showed an additional 1.2 foot rise in elevation. The Ohio River and Ice Creek surface water elevations also showed rises above the groundwater potentiometric surface, which creates a reverse flow effect and enhances the capture zone. Based on July 2003 field data, site-wide water levels had remained generally consistent with those from earlier in the year. However, the Ohio River and Ice Creek surface water elevations showed marked decreases, which would have the effect of protracting the capture zone along the Tar Plant and GDA boundaries along the Ohio River and Ice Creek. Actual measured precipitation during January through June 2003 totaled approximately 7.25 inches above normal, and caused flooding on the Site. Based on October 2003 field data, a decrease of approximately 0.6 feet was observed in the average site-wide potentiometric elevations as compared to the July 2003 measurements. The surface water elevations in Ice Creek and the Ohio River, however, remained at their normal elevations. Therefore, decreased capture of impacted groundwater in areas north of the GDA were noted. The total rainfall for 2003 indicated that it was the wettest year on record since startup of the pumping operations in 1997. Additionally, there was a flooding event in November 2003. With the exception of the areas north of the GDA, the impacted groundwater within the CPLA and Tar Plant continues to be captured. Following completion of cleaning of the pumps and lines, evaluation of the overall system will continue. If there continues to be a protracted capture zone in this northern sector, EPA and OEPA will likely require the drilling and operation of an additional extraction well.

Groundwater Chemistry

Quarterly monitoring over the last seven years has indicated generally improved conditions, particularly in the northern portion of the lagoon area. Throughout the remaining areas of the CPLA, localized groundwater contamination persists in the southern portion of the lagoon area and the central area of the Tar Plant. The results of the Ice Creek program (since 1993) have continually shown no degradation of the water quality in areas downgradient of the Site, including the Coal Grove Well Field (even with the aforementioned protracted capture zone over the past year).

GDA Vent Gas Sampling

Based on EPA and OEPA concurrence (May 2002), the GDA Vent Gas Sampling Program was terminated. This was based on review of the the Air Emissions Evaluation report submitted in March 2002. The principal conclusions from the evaluation (based on analytical data from 14 consecutive quarterly monitoring events) included the following:

- The emissions of VOCs from the four GDA vents are insignificant.

- The ambient impact to the nearest public receptor due to emissions from the vents is insignificant and orders of magnitude lower than the corresponding Maximum Allowable Ground Level Concentration (MAGLC).

As stipulated by EPA and OEPA, Honeywell continues to maintain the gas vents, in the event that future sampling is required.

Wetlands Monitoring

The monitoring program is annual and began in July 2002. Vegetation is lush and data collected over the past two years is indicative of a successful natural revegetation. However, benthic macroinvertebrate sampling, monitoring of the establishment of communities, and the presence/absence of invasive species will have to be carefully monitored over the next few years.

Site Inspection

EPA and OEPA conducted a Site inspection on July 28, 2004. Personnel from Honeywell (the PRP), Shaw Environmental (O&M contractor), OMI, (O&M Contractor and Waste Water Treatment Plant Operator) and Parsons Engineering (RI/FS contractor) accompanied the regulatory team in the inspection. The purpose of the inspection was to assess the protectiveness of the remedies, including the condition of fencing to restrict access, the integrity of the cap, the condition of the extraction well system, the condition of the WWTP, the condition of the monitoring wells, the effectiveness of land use restrictions, and the progress of the wetlands restoration.

The following statements summarize the main topics covered during the inspection:

- The cap appeared to be in good physical condition and the grass cover was freshly mowed. This is reflective of monthly reports and a previous Site inspection conducted by OEPA.

- Extraction and monitoring wells appeared to be in good condition and reflective of the monthly reports. Iron fouling is an ever present problem requiring considerable maintenance.

- Site fencing was intact and appeared to be in good condition. Signs were in good condition.

- The Wastewater Treatment Plant operations are clean, neat, and orderly.

- The new vegetation plots on the floodwall seem to indicate a good vegetation mix for a large scale future planting to improve stability and minimize erosion.

Interviews

Even during the amendments to the RODs, there has relatively been low community interest in this Site. For example, there were no comments provided at the public meeting held in July 1997. The RPM visited the information repository at the Briggs County Library (located within the City of Ironton) in July 2003. The librarian reported that she couldn't recall the last time anyone requested to look at the Site files. The library keeps the files in a reading room and the files are currently in disarray.

The low community interest in this Site is further supported by the fact that neither the RPM nor the CIC has been contacted by the community in recent years. Further, no community members responded to the five-year review ad that invited readers to contact the CIC for more information on the five-year review process. Therefore, the CIC and RPM decided not to conduct interviews of local residents.

However, because of the city's interest in redevelopment, Sharon Jaffess and Kevin O'Hara traveled to the Lawrence Economic Development Corporation (LEDC) office, located nearby, in South Point, Ohio. The LEDC is a non-profit Community Improvement Corporation formed under Chapter 1724, Ohio Revised Code. LEDC was formed in 1983 and was designated the economic development agent for the City of Ironton and Lawrence County. Ms. Jaffess and Mr. O'Hara met with the LEDC's Executive Director, Bill W. Dingus and a board member, Roger Haley (who is a former Allied employee during the time the Coke Plant and Tar Plant were operational). Mr. Dingus informed us that he was interested in the future utilization of Ice Creek to expand the shipping capabilities of the region. Mr. Dingus was interested to know if there are any outstanding issues related to the Site as it had previously affected Ice Creek. Ms. Jaffess agreed to research the information and provide Mr. Dingus with such information.

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

A review of the relevant documents results, and the results of the Site inspection indicate that the remedies are functioning as intended by the RODs, the ESD, and the three ROD Amendments. Through an extensive O&M program that includes groundwater monitoring, potentiometric monitoring, chemical analysis, and NPDES discharge monitoring, the capture zone is generally being maintained. A change in the pumping scheme to 300 gpm instead of 400 gpm (based on an optimization study) accompanied by higher than normal precipitation, has resulted in a somewhat protracted capture zone. This has been addressed through an increase in pumping rates (the present rate is now up to 380 gpm) and may be further addressed by the incorporation of an additional extraction well. The groundwater monitoring program also continues to demonstrate the effectiveness of the slurry wall and visual inspection of the cap demonstrates that it continues to be maintained in excellent condition. The wetlands development program is still in an early phase, but the initial sampling reports are promising.

Institutional controls at this Site are effective. First, there is a perimeter fence and Site security. Due to the operation of a WWTP, there is also a constant presence on the Site by Honeywell and/or its contractors. Second, the various tracts of land owned by Honeywell comprising the former coke plant and lagoon areas were consolidated into two tracts, one consolidating the tracts located in the City of Ironton, which has been assigned tax parcel number 36-042-0300 and one in the Village of Coal Grove, which has been assigned tax parcel number 29-050-0200. The parcel within the City of Ironton has subsequently been subdivided into 4 individual taxable parcels to assist with future brownfields redevelopment. The 5 parcels are as follows:

- Tract 5 (15.96 acres), Village of Coal Grove
- Tract 4 (28.39 acres), City of Ironton
- Tract 3 (38.31 acres), City of Ironton
- Tract 2 (6.82 acres), City of Ironton
- Tract 1 (1.42 acres), City of Ironton

Tracts 4 and 5 encompass the lagoon area. Tract 3 includes the former coke plant area. Tracts 1 and 2 encompass the former administrative and truck parking areas, as well as the WWTP (Tract 2).

The aforementioned 5 taxable parcels have been recorded (August 8, 2002) with the following environmental restrictions in the Lawrence County Recorder's Office (deed restrictions):

- There shall be no consumptive or other use of the groundwater underlying the real property that is the subject of the EPA Order for any purpose other than compliance with the Order;

- There shall be no future use of the property that may interfere with the work to be performed under the Order;

- There shall be no residential or recreational use of the property, including, but not limited to, any construction of residences, excavation, grading, filling, drilling, mining, or other construction or development, farming, placing (except as contemplated within the Order) of any waste material at any portion of the property or any other activity which may damage or impair the effectiveness of any remedial action undertaken pursuant to the Order, except with the approval of the EPA;

The foregoing land use restrictions shall continue until such time as the same are released by action of the EPA.

The deed restriction for the five tracts also states that the land use restrictions shall run with the land in perpetuity:

- The property shall not be used for purposes of personal living, dwelling, or overnight accommodations, whether such uses are in single family residences, apartments, duplexes or other multiple residential dwellings, trailers, trailer parks, camping sites, hotels, motels, or

any other dwelling use of any kind, by the owner or occupant of the property, or anyone occupying the property with the permission of the then owner of the property;

- The groundwater underneath the property shall not be used for human consumption, irrigation, or other purposes that might bring it into contact with humans (except for test purposes as required by law), and that neither it, nor its successors, will drill or install any wells on the property for the purpose of extracting groundwater underneath the property for human consumption, irrigation, or other purposes that might bring it into contact with humans (except for testing purposes, as required by law), and that nor shall any existing groundwater monitoring wells be abandoned except in compliance with applicable regulations and with the prior specific knowledge and approval of the EPA; and that no person shall in any way interfere with, or suffer or permit the interference with, the existence, operation, and maintenance of existing groundwater monitoring wells.

Tracks 1 and 3 were purchased by the City of Ironton from Honeywell, with a portion of Tract 3 conveyed to the Ohio Department of Transportation for industrial re-use.

The GDA, located adjacent to the Tar Plant (and west of 3rd Street, or across the street from the aforementioned tracts) is on a parcel owned and fully maintained by Honeywell. This parcel was originally two tracts of land: 11.63 acres (originally owned by Marting Iron and Steel Company, which was sold to Margaret V. Goldcamp on December 5, 1938) and 0.04 acre adjacent to Third Street (originally owned by Ashland Iron and Bridge Company, which was sold to Henry I. Goldcamp on August 8, 1943). Allied Chemical and Dye Company signed an option agreement for the disposal site on March 30, 1955 and later purchased the property in June 1955. This property became Honeywell's upon Honeywell's merger with Allied. The Unilateral Administrative Order (V-W-89-C-007) dated March 9, 1989 required restrictions on this property as follows:

- There shall be no consumptive or other use of the ground water underlying the property that could cause exposure of humans or animals to the ground water underlying the GDA.

- There shall be no use of the area presently over the existing GDA pit and, in the future, the area to be enclosed by the slurry wall including but not limited to the construction, installation, or use of any structures or buildings other than for the purpose of implementing the remedial actions required by this Administrative Order.

- There shall be no use of the property that would allow the continued presence of humans at the area presently over the existing GDA pit and, in the future, the area to be enclosed by the slurry wall other than any presence necessary for implementation of the remedial actions under this Administrative Order. Prohibited uses which would allow the continued presence of humans at this particular real estate will include but not necessarily be limited to recreational or educational uses.

- There shall be no installation, construction or use of any buildings, wells, pipes, roads,

ditches or any structures at the area presently over the existing GDA pit, and, in the future, the area to be enclosed by the slurry wall except as approved by the EPA as being consistent with this Administrative Order.

The GDA property is completely fenced and requires operation and maintenance by Honeywell into perpetuity (landscaping, mowing, quarterly groundwater monitoring, daily pumping system observation and maintenance). Like the CPLA area, it is under constant security and monitoring by Honeywell contract employees, stationed at the WWTP. These restrictions are being met. Honeywell, as part of their OU3/Tar Plant work, has prepared a consolidation survey plat of the properties comprising the GDA and the Tar Plant. This survey plat shows the consolidation of all of Honeywell's parcels, including the GDA and Tar Plant property. Two new tax parcels were created: Tract A, Tax No. 36-042-0100 (25.66 acres) and Tract B, Tax No. 36-042-0200 (11.88 acres). Tract A contains the GDA and the Tar Plant area. Tract B contains the portion of the Tar Plant area property that extends to the Ohio River shoreline. The specific environmental restrictions, mentioned above, are not contained on the survey plat. EPA will work with Honeywell to ensure that as part of the OU3 Tar Plant work, the tract of land (parcel A) that contains the Tar Plant and GDA reflects the required GDA deed restrictions on a revised survey plat and in the deed.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The exposure assumptions, toxicity data, cleanup levels, and RAOs used for remedy selections (and amended) are still valid.

Changes in Standards and To be Considered (TBC)

The soil clean-up levels established were:

- 0.97mg/kg for carcinogenic PAHs (10-6 excess cancer risk) [sum of benzo(a)pyrene (B(a)P), benzo(a)anthracene (B(a)A), dibenzo(a,h)anthracene (D(a,h)A), and chrysene] and

- 0.56 mg/kg for arsenic (later revised to 15 mg/kg based on site-specific background evaluation).

The groundwater clean-up levels established were:

Contaminant	Cleanup Standard
Benzo(a)pyrene	200 ppt
Dibenz(a,h)anthracene	300 ppt
Arsenic	50 ppb
Ammonia	30 ppm
Phenolics	4 ppm
Benzene	5 ppb
Naphthalene	300 ppb
Nitrate	10 ppm
Total Cyanide	200 ppb

ppt parts per trillion
ppb parts per billion
ppm parts per million

There have been no changes in these ARARs and TBCs that affect the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

There have been no changes in the exposure assumptions that were used in the risk assessment that would affect the protectiveness of the remedy. EPA considers the assumptions in the baseline risk assessment to be conservative and reasonable in evaluating risk-based cleanup levels. No change to these assumptions or to the cleanup levels developed from them is warranted. There has been no change in the standardized risk assessment methodology that would affect the protectiveness of the remedy. Because the remedy implemented engineering and institutional controls to prevent contact with contaminants that remain at the Site, changes in contaminant toxicity would not impact the effectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other events have affected the protectiveness of the remedy, and there is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

Based on a review of relevant documents, data, ARARs, risk assumptions, and the results of the Site inspection, it appears to EPA that the remedy is functioning as intended by the RODs, including the ESD and the three ROD Amendments.. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. There have been no changes in exposure pathways or toxicity factors for the contaminants of concern which would impact the effectiveness of the remedy. The remedies have been implemented in accordance with the design plans, and in accordance with pre-design sampling which helped effectuate better remedies. Once pumping rates are increased to previous levels, EPA expects the capture zone to be fully protective. There is no other information available that calls into question the protectiveness of the remedy.

VIII. ISSUES

Problem

- Capture Zone is protracted due to a reduction in pumping rates and higher than normal precipitation;

- Coal and coke fines transported to the Biomass facility remain at the South Point facility and have not yet been used for alternative fuel. The material was inspected as part of the field inspection. It was stored in a building. However, the building is somewhat decayed and has huge holes in the roof and there are large open cavities in the walls. The material is completely exposed to the elements, most notably precipitation and wind. While the building has a cement floor, there is nothing to prevent leaching of the material. It also appeared to the OEPA inspector, that some of the material had been removed.

Resolution

- Honeywell is increasing the extraction rate of pumping wells. If the existing wells, which were recently (summer 2004) rehabilitated cannot sustain the required pumping rates, an additional extraction well will be installed.

- OEPA has already attempted enforcement action against the owner of the Biomass facility. No resolution has been reached. EPA will contact the Biomass facility owner, and Honeywell, to discuss proper disposal options, if the material is not going to be used as an alternative fuel. EPA will also be requesting that Biomass place tarps over the building, and board up the openings in the walls to prevent precipitation and wind exposure.

The aforementioned actions will be taken in the Fall of 2004.

IX. Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Mile-stone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Pumping Rate	Continued monitoring, installation of a new extraction well	Honeywell	EPA	Fall 2004	N	N
Coal and Coke Fines	Contact Biomass facility owner	EPA	OEPA	Fall 2004	N	N
GDA Deed Restrictions	Ensure GDA restrictions are recorded with the Lawrence County Recorder's Office	Honeywell	EPA	Fall 2004	N	N
Ice Creek Potential Use for shipping	Lawrence Economic Development Corp. interested in future use of Ice Creek and requested information on Ice Creek as it relates to the Site	EPA	OEPA	Fall 2004	N	N

X. Protectiveness Statement

The remedies at the Allied Chemical and Ironton Coke Site are protective of human health and the environment because threats at the Site have been addressed through capping, maintaining inward hydraulic gradients, maintaining an adequate groundwater contaminant capture zone, installation of fencing and warning signs, and implementation of institutional controls (deed restrictions).

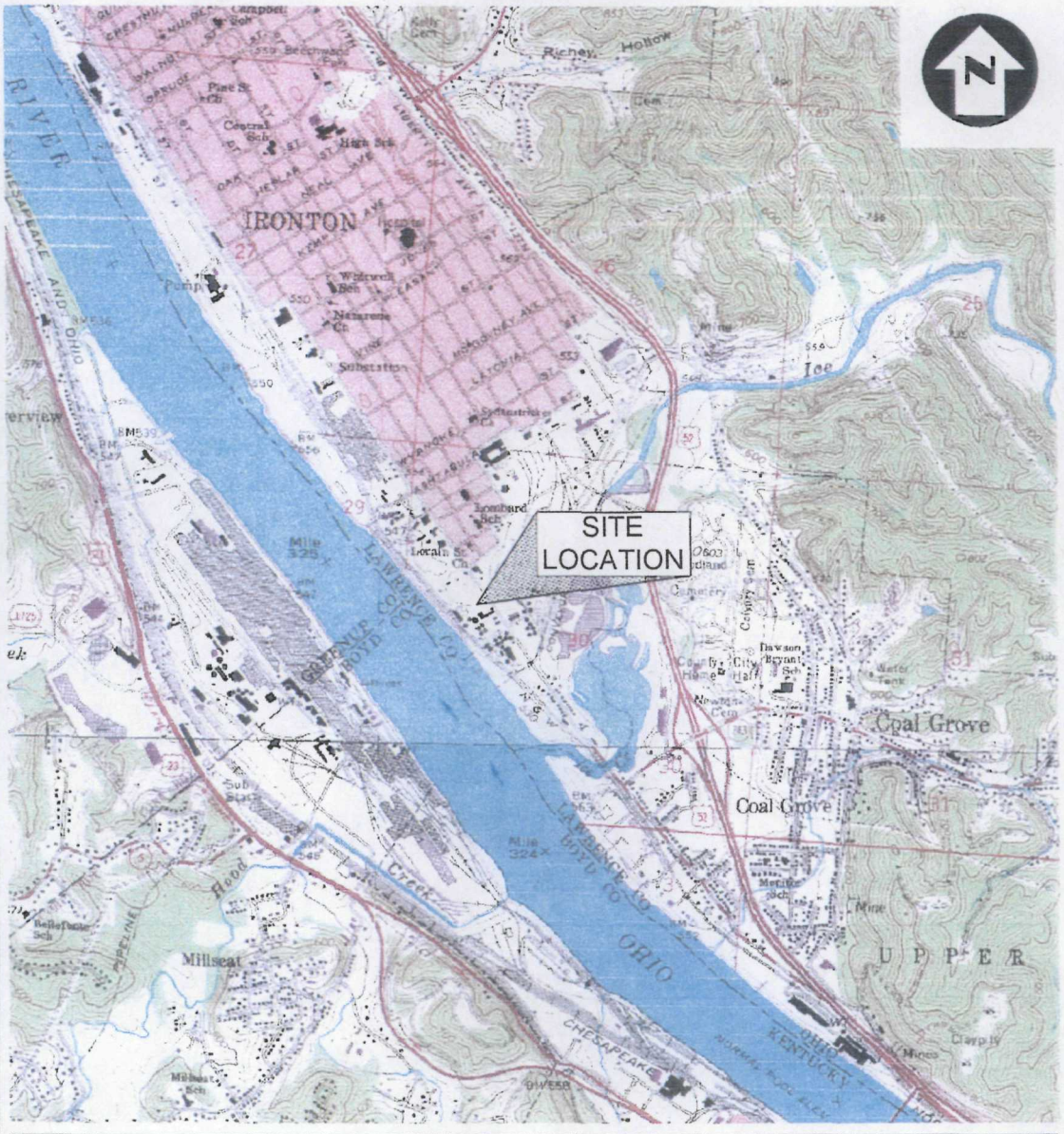
XI. Next Review

The next Five-Year Review for the Allied Chemical and Ironton Coke Superfund Site is required by August 2009, five years from the date of this review.

Appendix 1

Maps

MAP 1 - SITE LOCATION



2000 1000 0 2000

SCALE IN FEET

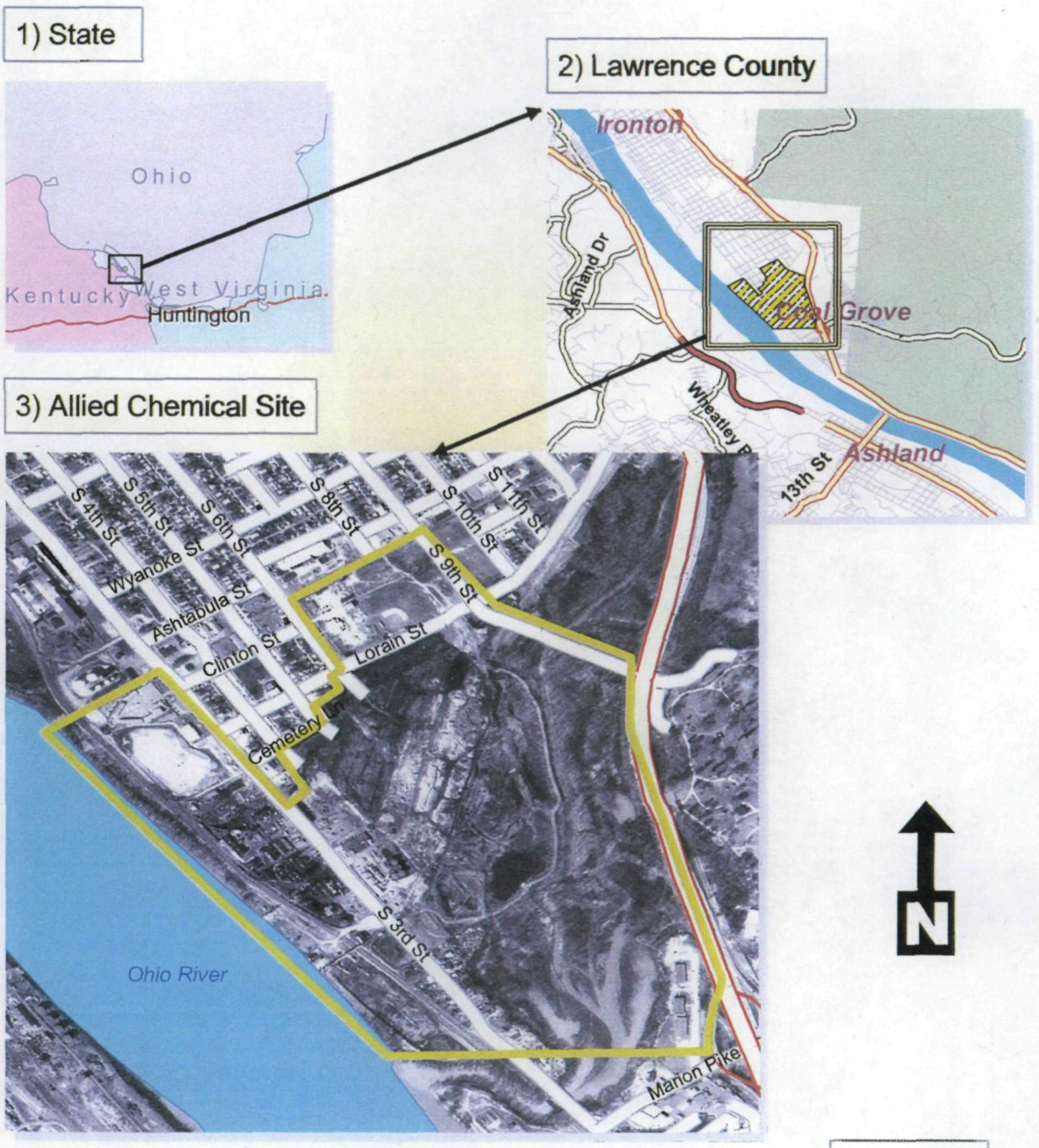
OHIO
QUADRANGLE LOCATION

HONEYWELL	
TAR PLANT FACILITY IRONTON, OHIO	FIGURE 2-2 SITE LOCATION MAP

PARSONS
19101 VILLAVIEW ROAD, CLEVELAND, OH 44119, PHONE: 216-486-9005

440705.02200
\\CLEFS01\HONEYWELL_IRON\RIFS\WP...40705_FIG2-2.DWG 2/17/04

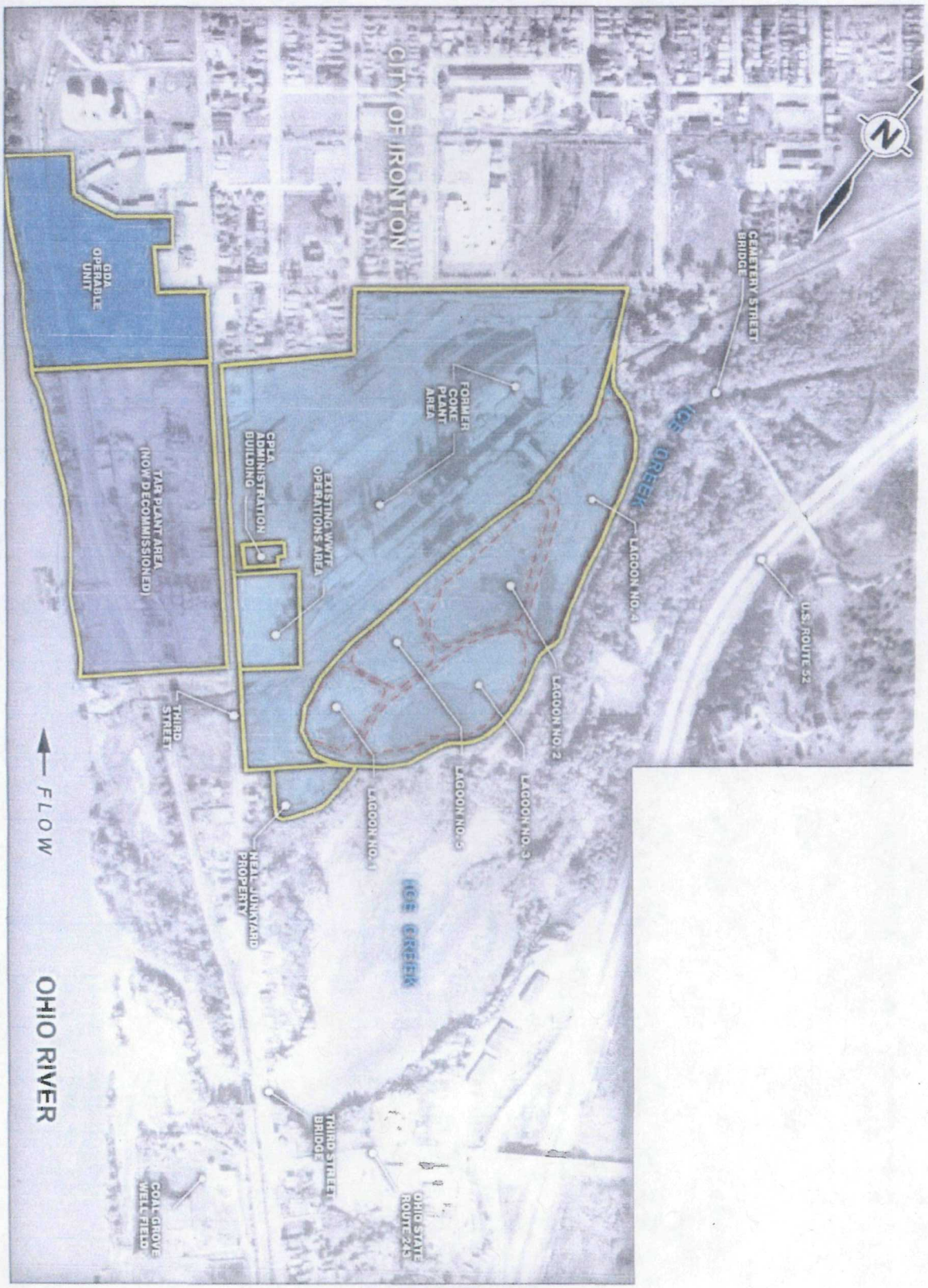
Allied Chemical Site



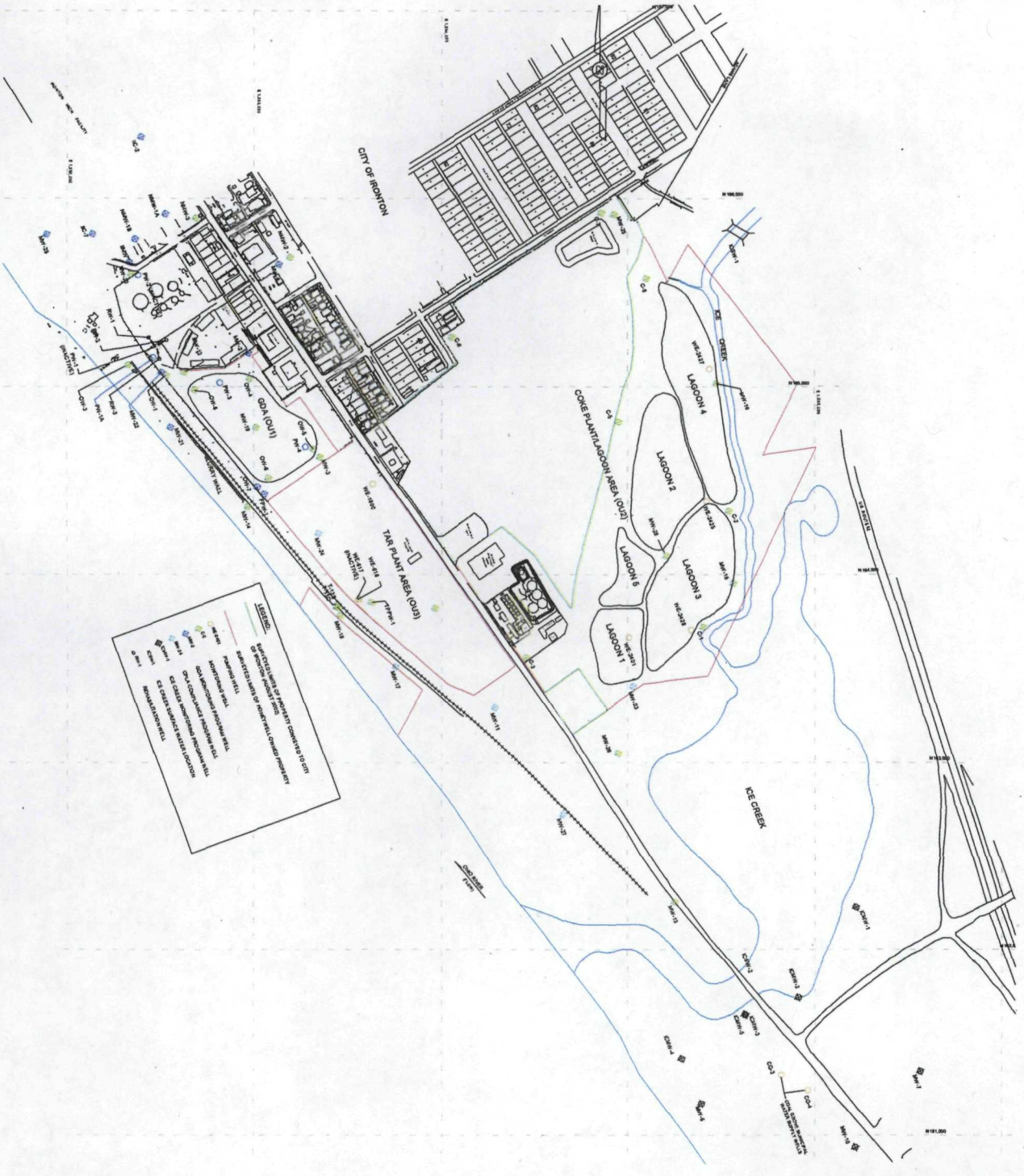
MAP 1A

GEOS
Groundwater Evaluation and Optimization System

MAP 2 - OPERABLE UNIT LOCATIONS / PROPERTY BOUNDARIES



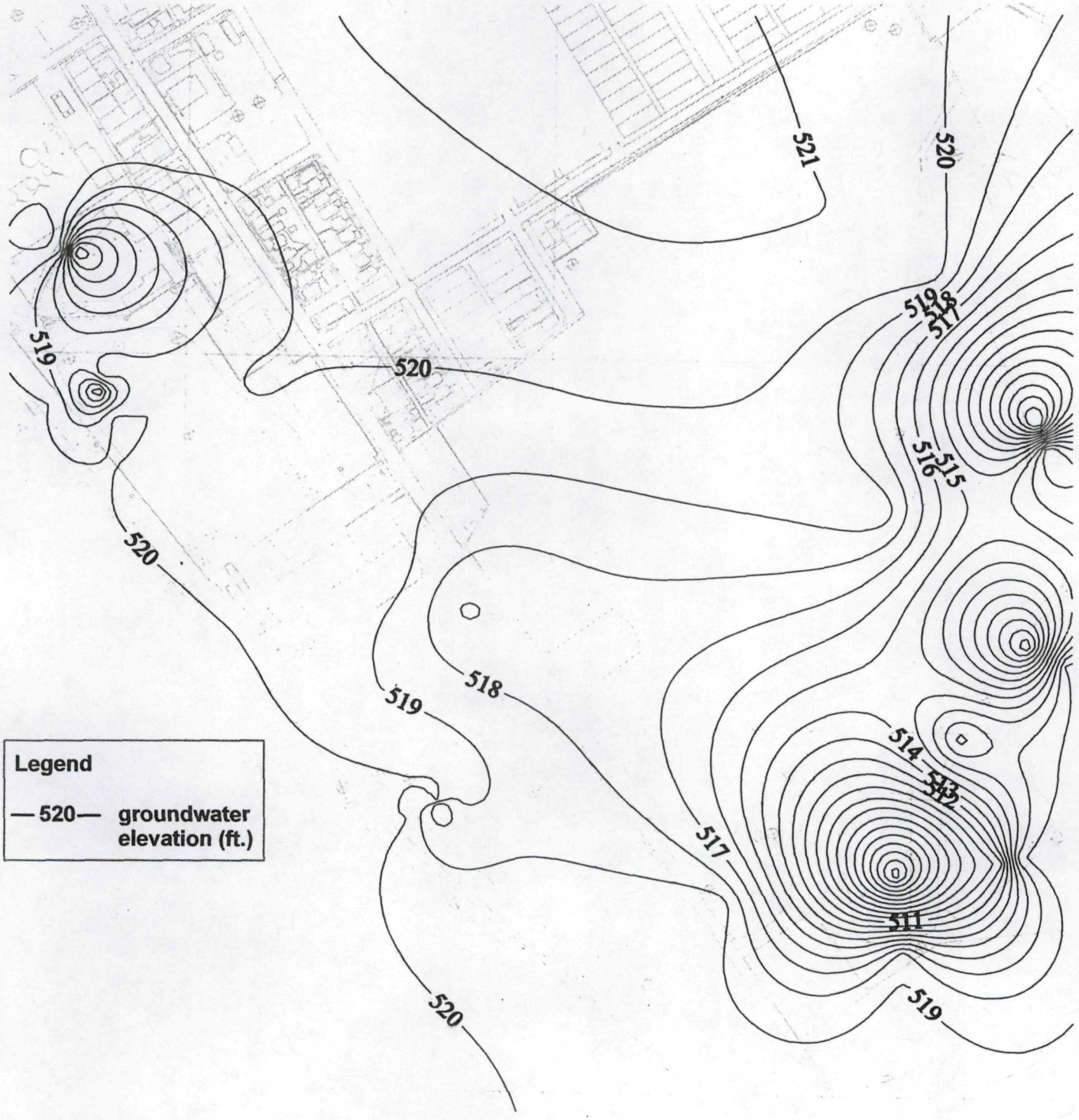
Allied Chemical Superfund Site



MAP 2A

GEOS
Groundwater Evaluation and Optimization System

Allied Chemical Superfund Site
Groundwater Contours on 4/8/2004



Legend

— 520 — groundwater elevation (ft.)

Map 3

GEOS
Groundwater Evaluation and Optimization System

Appendix 2

Photographs

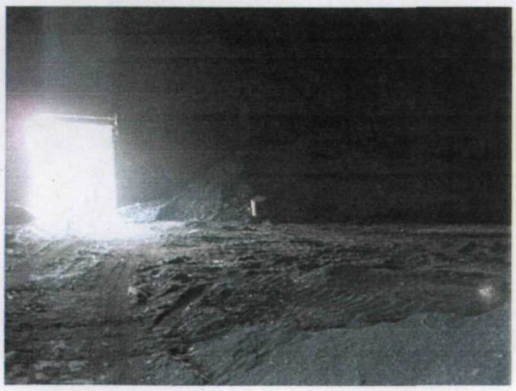
PHOTOGRAPH 1 - RE-USE OF SITE BY OHIO DEPT. OF TRANSPORTATION

PHOTOGRAPH 2 - LAGOON CONVERSION TO WETLANDS VEGETATION

PHOTOGRAPH 3 - EXTERIOR OF STORAGE BUILDING FOR COKE FINES AT SOUTHPOINT'S BIOMASS FACILITY

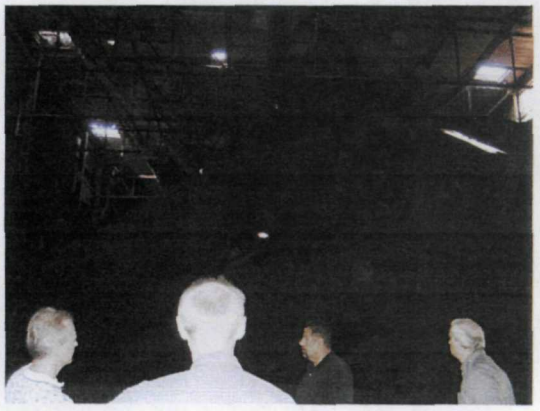
PHOTOGRAPH 4 - INTERIOR OF BIOMASS BUILDING AT SOUTHPOINT FACILITY WITH COKE FINES SHOWING HOLES IN ROOF AND OPEN DOORWAY

PHOTOGRAPH 5 - INTERIOR OF BIOMASS BUILDING AT SOUTH POINT SITE SHOWING OPEN DOORWAY AND POOR STORAGE CONDITIONS



PHOTOGRAPH 6 - INTERIOR OF BIOMASS BUILDING AT SOUTH POINT FACILITY SHOWING HOLES IN BUILDING WALLS

PHOTOGRAPH 7 - INTERIOR OF BIOMASS BUILDING AT SOUTH POINT FACILITY SHOWING HEIGHT OF COKE FINES WITHIN BUILDING



PHOTOGRAPH 8 - INTERIOR OF BIOMASS BUILDING AT SOUTH POINT FACILITY SHOWING STORAGE CONDITIONS

PHOTOGRAPH 9 - FLOODWALL REVEGETATION PROGRAM

PHOTOGRAPH 10 - LAGOON REVEGETATION

PHOTOGRAPH 11 - FISH COLLECTED FROM LAGOON

PHOTOGRAPHS 12 AND 13: LAGOON VEGETATION BEFORE AND AFTER

PHOTOGRAPH 14 - NPDES MONITORING POINT FOR WWTP

PHOTOGRAPHS 15 & 16 - GDA

Appendix 3

Other Supporting Documentation

Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Allied Chem. + Ironton Coke	**Date of inspection:** 7/28/04
Location and Region: Ironton, Ohio 5	**EPA ID:** OHD043730217
Agency, office, or company leading the five-year review: EPA R.5	**Weather/temperature:** 80° ~ hot / cloudy

Remedy Includes: (Check all that apply)

- ✓ Landfill cover/containment
- ✓ Access controls
- ✓ Institutional controls
- ✓ Groundwater pump and treatment
- ✓ Surface water collection and treatment
- Other wetland revegetation
- Monitored natural attenuation
- ✓ Groundwater containment
- ✓ Vertical barrier walls

Attachments: ~~Inspection team roster attached~~ Site map attached

II. INTERVIEWS (Check all that apply)

1. ✓ **O&M site manager** Joe / Dave _____ _____
   Name Title Date
   Interviewed (at site) at office by phone Phone no. _____
   Problems, ~~suggestions~~; Report attached _____

2. ✓ **O&M staff** Joe / Dave _____ _____
   Name Title Date
   Interviewed (at site) at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

Joe Davis, OMI, Inc.
David Shutt, Shaw Environmental

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Lawience Economic Development Corp.
Contact Bill W. Dingus Exec. Director 7/28/94 740-377-4570
Name Title Date Phone no.
Problems; suggestions; Report attached
wants info on sediment in Ice Creek for redevelopment info.

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	✓ Readily available	Up to date	N/A
	As-built drawings	✓ Readily available	Up to date	N/A
	Maintenance logs	✓ Readily available	Up to date	N/A
	Remarks			
2.	**Site-Specific Health and Safety Plan**	✓ Readily available	✓ Up to date	N/A
	Contingency plan/emergency response plan	✓ Readily available	✓ Up to date	N/A
	Remarks			
3.	**O&M and OSHA Training Records**	✓ Readily available	✓ Up to date	N/A
	Remarks			
4.	**Permits and Service Agreements**			
	✓ Air discharge permit – under threshold.	Readily available	Up to date	N/A
	Effluent discharge	✓ Readily available	✓ Up to date	N/A
	Waste disposal, POTW	✓ Readily available	✓ Up to date	N/A
	Other permits	Readily available	Up to date	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	N/A
	Remarks Non-detect / trace levels			
6.	**Settlement Monument Records**	Readily available	Up to date	N/A
	Remarks			
7.	**Groundwater Monitoring Records**	✓ Readily available	✓ Up to date	N/A
	Remarks			
8.	**Leachate Extraction Records**	Readily available	Up to date	N/A
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	N/A
	✓ Water (effluent)	✓ Readily available	✓ Up to date	N/A
	Remarks			
10.	**Daily Access/Security Logs**	✓ Readily available	✓ Up to date	N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**

State in-house — PRP in-house (w/ oversight) — Federal Facility in-house — Other _____

Contractor for State — Contractor for PRP (OMI) — Contractor for Federal Facility

2. ✓ **O&M Cost Records**

Readily available — Up to date — Funding mechanism/agreement in place

Original O&M cost estimate _____ Breakdown attached

Honeywell agreed to supply us with their cost info.

Total annual cost by year for review period if available

From _____ Date	To _____ Date	_____ Total cost	Breakdown attached
From _____ Date	To _____ Date	_____ Total cost	Breakdown attached
From _____ Date	To _____ Date	_____ Total cost	Breakdown attached
From _____ Date	To _____ Date	_____ Total cost	Breakdown attached
From _____ Date	To _____ Date	_____ Total cost	Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

*IRON — molemaster / pipe cleaning > $70K.

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing good condition.

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A

Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A

Remarks site is well marked / OSHA required signs available.

C. Institutional Controls (ICs) Fences / Deed Restriction

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) self-reporting + state yearly
Frequency inspection
Responsible party/agency _____
Contact State: Kevin O'Hara — Case Manager — _____ — _____
Name — Title — Date — Phone no.

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks _____

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks _____

2. **Land use changes on site** (N/A)
Remarks _____

3. **Land use changes off site** (N/A)
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks Roads in good condition.

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS

Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks maintained
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

N/A to GDA

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - ~~Wet areas~~ — Location shown on site map — Areal extent_____
   - ~~Ponding~~ — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks area is wetland (layer)

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches — Applicable — N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels — Applicable — ~~N/A~~

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — ~~No evidence of settlement~~
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — ~~No evidence of degradation~~
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — ~~No evidence of erosion~~
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map (No evidence of undercutting)
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ (No obstructions)
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
(No evidence of excessive growth) some purple lousetife.
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** ~~Active~~ (Passive)
~~Properly secured/locked~~ ~~Functioning~~ Routinely sampled (Good condition)
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance ~~N/A~~
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
(Properly secured/locked) (Functioning) (Routinely sampled) (Good condition)
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
(Properly secured/locked) (Functioning) (Routinely sampled) (Good condition)
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located (Previously Routinely surveyed) (N/A) not needed anymore.
Remarks → along slurry wall.

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable (N/A)

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable (N/A)

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   (Vegetation does not impede flow)
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map (Erosion not evident)
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** (Functioning) N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS (Applicable) N/A

1. **Settlement** Location shown on site map (Settlement not evident)
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring N/A.
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES (Applicable) N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines — Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   (Good condition) All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   (Good condition) Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   (Readily available) Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines — (Applicable) N/A

1. **Collection Structures, Pumps, and Electrical**
   (Good condition) Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   (Good condition) Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   (Readily available) Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System — Applicable / N/A

1. **Treatment Train** (Check components that apply)
   - ✓ Metals removal
   - ✓ Oil/water separation
   - Bioremediation
   - Air stripping
   - ✓ Carbon adsorbers
   - Filters sand/carbon
   - Additive (*e.g.*, chelation agent, flocculent)
   - Others
   - Good condition / Needs Maintenance
   - Sampling ports properly marked and functional yes
   - Sampling/maintenance log displayed and up to date yes
   - Equipment properly identified yes
   - Quantity of groundwater treated annually 160,000,000 gal
   - Quantity of surface water treated annually + 12,000,000 gal.
   - Remarks
   Since 1995 - TO DATE: 160,000,000 gal. Split btwn outfall + inside.

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - N/A / Good condition / Needs Maintenance
   - Remarks

3. **Tanks, Vaults, Storage Vessels**
   - N/A / Good condition / Proper secondary containment / Needs Maintenance
   - Remarks

4. **Discharge Structure and Appurtenances**
   - N/A / Good condition / Needs Maintenance
   - Remarks

5. **Treatment Building(s)**
   - N/A / Good condition (esp. roof and doorways) / Needs repair
   - Chemicals and equipment properly stored
   - Remarks

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked / Functioning / Routinely sampled / Good condition
   - All required wells located / Needs Maintenance / N/A
   - Remarks

D. Monitoring Data

1. Monitoring Data
   - Is routinely submitted on time yes / Is of acceptable quality yes

2. Monitoring data suggests:
   - Groundwater plume is effectively contained / Contaminant concentrations are declining

D. Monitored Natural Attenuation N/A

1. **Monitoring Wells** (natural attenuation remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Containment - effective + functioning

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O+M contractor on-site / offices + records in good condition.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

Iron build up at treatment plant (naturally occurring conditions) requires lot's of maintenance.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Remedy appears optimal at this time. Monitoring frequencies have previously been adjusted.

Pre-Inspection Meeting Sign-In Sheet

Ironton July 28, 2004

	Name	Company	Phone	E-mail
(1)	Jennifer Baran	OBG/Honeywell	973-455-4102	jennifer.baran@honeywell.com
(2)	Steve Meininger	OMI	443-535-9408	smeining@omiinc.com
(3)	David Shott	Shaw	412-858-3329	David.shott@shawgrp.com
(4)	Richard Galloway	Honeywell	973-455-4640	Rich.Galloway@honeywell.com
(5)	Kevin O'Hara	Ohio EPA	740-380-5247	kevin.ohara@epa.state.oh.us
(6)	Sharon Jaffess	US EPA	312-353-0536	jaffess.sharon@epa.gov
(7)	Nabil Fayoumi	USEPA	312-886-6840	fayoumi.nabil@epa.gov
(8)	Richard Volpi	Parsons	216-496-9005	Richard.Volpi@Parsons.com
(9)	Peter Gelman	Parsons	216-486-9005	Peter.Gelman@Parsons.com
(10)	Steve Conn	Parsons	952-830-3688	Steve.Conn@Honeywell.com
(11)	Joe Davis	OMI Inc	330 310 2806	joe.davis@omiinc.com
(12)	Chuck Geadleman	Honeywell	952-830-3685	chuck.geadleman@honeywell.com

Five Year Review Public Notice

hit the last vehicle in the convoy accompanying Hayat, the Karachi corps commander, near the city's Clifton Bridge. Soldiers returned fire, and the gunmen fled in at least one car, witnesses said.

Hayat was unscathed, chief army spokesman Maj. Gen. Shaukat Sultan told The Associated Press in the capital, Islamabad.

Engines used in banned arms found in Jordan

UNITED NATIONS (AP) — Twenty engines from banned Iraqi missiles were found in a Jordanian scrap yard along with other equipment that could be used for weapons of mass destruction, a U.N. official said, raising new security questions about Iraq's scrap metal sales since the fall of Saddam Hussein.

Acting chief United Nations inspector Demetrius Perricos revealed the discoveries to the U.N. Security Council in a closed-door briefing Wednesday. A text of his briefing was obtained by The Associated Press.

The U.N. team that found the 20 engines was following up on an earlier discovery of a similar Al Samoud 2 engine in a scrap yard in the Dutch port of Rotterdam. Perricos said inspectors also want to check in Turkey, which has also received scrap metal from Iraq.

Billionaire spending big to try to oust Bush

NEW YORK (AP) — George Soros' dream is President Bush losing in November — and so far, the billionaire philanthropist has donated nearly $13 million to independent groups that also want to turn that vision into reality. "I'm merely putting my money where my mouth is," Soros told The Associated Press.

EPA Reviews Allied Chemical Cleanup

U.S. Environmental Protection Agency Region 5 is conducting a regularly scheduled review of the **Allied Chemical & Ironton Coke Plant in Ironton, Ohio**. The Superfund law requires reviews at least every five years to make sure the cleanup continues to protect people's health and the environment. The cleanup involved demolition of the coke plant, encapsulation of the Goldcamp Disposal area, excavation and off-site disposal of contaminated soil and coal from the property, and removal and treatment of contaminated ground water. The former lagoon area has been converted into a wetlands ecosystem.

The review is scheduled to be completed by August 27, and you can read it then at:

Briggs Lawrence County Public Library
321 S. 4th St.
Ironton

For more information on the review process, please contact:

Zenny Sadlon
EPA Community Involvement Coordinator
(312) 886-6682
sadlon.zenny@epa.gov

or call toll-free weekdays 10 a.m. – 5:30 p.m.
(800) 621-8431 ext. 66682

Previous Five Year Review (1999)

FIVE YEAR REVIEW REPORT

AlliedSignal/Ironton Coke Superfund Site
Ironton, Ohio

Pursuant to CERCLA

Prepared by:
U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

Richard C Karl for
William E. Muno,
Superfund Division Director

8-27-99
Date

5-yr. Review - alliedSignal/Ironton Coke Superfund Site
8/27/99

I. INTRODUCTION

A. Authority and Purpose

Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and Section 300.430(f)(4)(ii) of the National Contingency Plan (NCP), require that periodic (no less than five years) reviews are to be conducted for sites where hazardous substances, pollutants or contaminants remain at the site above levels that will not allow for unlimited use or unrestricted exposure following the completion of remedial actions for the site. The purpose of a statutory five year review is to evaluate whether the remedial action remains protective of human health and the environment. This review focuses on the protectiveness of the remedy selected for operable unit 1 (OU1), Goldcamp Disposal Area (GDA) and OU2, Coke Plant/Lagoon Area (CPLA) at the AlliedSignal/Ironton Coke Superfund site (the Site) in Ironton, Ohio.

The United States Environmental Protection Agency (U.S. EPA) has established a three-tier (with a sub-tier for Tier I, as Ia) approach to conducting Five-Year Reviews, the most basic of which provides a minimum protectiveness evaluation for sites with on-going response actions at the site (Level Ia review). U.S. EPA contemplates that a Level Ia review will be appropriate in all but a relatively few cases where site-specific circumstances suggest otherwise. The second and third levels (Level II and Level III) of review are intended to provide flexibility to respond to varying site-specific considerations, employing further analysis. Site-specific considerations, including the nature of the response action, the status of the on-site response activities, and the proximity to populated regions and sensitive environmental areas determine the level of review for a given site. The Level Ia review conducted for this site is applicable to a site at which response is ongoing.

B. Site History

The AlliedSignal/Ironton Coke Superfund site, located in Ironton, Lawrence County, Ohio is approximately 95-acres in size. The site consists of a dismantled coke plant which operated from 1920 to 1982 and five lagoons which received process wastewater and hazardous solid waste from the former coke plant. A waste pit called the Goldcamp Disposal Area (GDA) is also part of the site and an operating AlliedSignal Tar Plant is within the site boundaries. The AlliedSignal/Ironton Coke site is divided into two operable units, the GDA, which is operable unit 1 (OU1), and the Coke Plant/Lagoon Area (CPLA), which is operable unit 2 (OU2). This Level Ia five-year review is being conducted to evaluate the protectiveness of the remedial actions.

GDA - OU1

The GDA is an approximately 4 acre disposal pit which extends nearly 40 feet down from ground surface. The GDA was a former sand and gravel pit used for the disposal of Tar Plant process chemical wastes during the period of 1945 to 1977. In 1977, AlliedSignal in consultation with the Ohio Environmental Protection Agency (Ohio EPA) developed a plan for closure of the GDA. The closure, completed in 1980, included, removal of standing liquids and filling and capping of the site with clay. Based upon the results of hydrogeologic and water quality investigations, which indicated that groundwater contamination was migrating from the site, the Ohio EPA requested inclusion of the site on the Superfund National Priorities List (NPL). The site was added to the NPL in September 1983.

A remedial investigation/feasibility study (RI/FS) was initiated by the U.S. EPA, however, ongoing negotiations between the U.S. EPA, the Ohio EPA, and AlliedSignal resulted in Allied taking over the project in late 1983 and eventually signing an Administrative Order on Consent (AOC) to conduct the RI/FS on April 13, 1984. The final RI was completed in July 1986. After completion of the RI the site was divided into two operable units as mentioned previously. The FS for the GDA OU1 was completed in August 1988. A Record of Decision for the GDA OU1 was signed by the U.S. EPA on September 29, 1988.

The remedial design/remedial action (RD/RA) for the site were performed under a Unilateral Administrative Order (UAO) by AlliedSignal and AMCAST Industrial. The effective date of the UAO was March 9, 1989.

The remedial action for the GDA OU1 included the construction of a slurry wall around an existing waste pit. A pumping well network was also constructed to maintain an inward gradient inside the slurry wall and contain contamination inside the slurry wall. Groundwater pumped from the wells is treated at an on-site water treatment facility. A monitoring well network was established to monitor the effectiveness of the containment system and track a non-aqueous phase liquid plume in the groundwater that exists outside the slurry wall.

CPLA - OU2

The Coke Plant area once contained the site administration building, a coke battery with associated processing facilities, storage tanks, piping, and a network of railroad lines used for transporting coal and coke. Various areas containing contaminated soils and coal/coke fines were identified in the Coke Plant area. Additional zones of contaminated soil were identified in the Tar Plant, which is still an operating facility adjacent to the former coke plant. The Lagoon area is a former marshy area where waste were periodically dumped. In 1970, five lagoons were constructed in the area for the purpose of treating these wastes. Process waste water, stormwater run-off and some waste sludge were discharged to Lagoons 1, 2, 3, and 4, while solid waste, including decanter tank tar sludge, was deposited in Lagoon 5.

In 1984, a Consent Order between AlliedSignal, Ohio EPA, and U.S. EPA, requiring AlliedSignal to conduct a RI/FS. The RI was completed in July, 1986 and the FS was completed

in July, 1990. A second Consent Order between U.S. EPA and AlliedSignal was signed in 1987. This Consent Order required AlliedSignal to dismantle and decontaminate processing facilities associated with the Coke Plant and is still on-going. A ROD was signed for the CPLA in December 28, 1990. The RD/RA for the CPLA is through a UAO, dated July 1,1991, issued to AlliedSignal. Three subsequent ROD Amendments dated July 31, 1995, September 4, 1997, and September 30, 1998, modified the original 1990 ROD.

The original remedial action for the CPLA included:

- incineration of approximately 122,000 cubic yards (cy) of lagoon waste materials, and on-site re-use of the waste heat generated during the incineration (waste fuel recovery);
- in-situ bioremediation of approximately 457,000 cy of lagoon waste material;
- prepared-pad surface bioremediation of approximately 40,000 cy of contaminated soil materials;
- pumping and on-site treatment of groundwater;
- monitoring of groundwater downgradient of Ice Creek and preparation of a contingency plan;
- fencing, security, and deed restrictions; and
- evaluation of the effectiveness of in-situ bioremediation, with a contingency for development of an alternative remedial action for Lagoons 1 through 4.

The ROD Amendments modifications included:

- revising the clean-up standards for benzo(a)pyrene and dibenz(a,h)anthracene in groundwater for the GDA and the CPLA;
- excavation and storage on-site for eventual treatment or placement into the lagoon area of 135,000 cy of soils found to be contaminated with low levels of PAHs during the design phase;
- replacing prepared-pad bioremediation of 40,000 cy of soil with off-site disposal in an approved landfill;
- replace in-situ bioremediation of 457,000 cy of soil in Lagoons 1-4 with hot-spot excavation and wetland development; and
- replace incineration of 122,000 cy of Lagoon 5 materials with recycling, treatment, and/or disposal of the KO87 listed waste in an approved off-site hazardous waste facility and the use of the remaining material, excluding debris, as an alternative fuel.

II. DISCUSSION

A. Remedial Objectives

The remedial action goals of the RODs for the Site were to minimize risks to public health and the environment from direct contact with contaminated materials and to minimize the migration of contaminants to groundwater. The remedies selected to meet these objectives included:

GDA- OU1

- Constructing a slurry wall encircling the GDA landfill;
- Creating an inward groundwater gradient within the slurry wall boundaries;
- Capping the GDA landfill;
- Treating ground water extracted from inside and outside of the slurry wall at a new treatment facility;
- Providing a municipal water hook-up for sanitary/potable use for users of Ironton Iron Inc.;
- Monitoring of site ground water;
- Securing the site from unauthorized personnel and deed restrictions; and
- Non-aqueous phase substance (NAPS) investigation and implementation of the U.S. EPA approved remedy, if different than the present containment alternative.

CPLA - OU2

- Hot spot excavation and wetland development for approximately 475,000 cy of material in Lagoons 1-4;
- Recycling, treatment, disposal, and/or use as alternative fuel of approximately122,000 cy of material from Lagoon 5;
- Off-site disposal of approximately 40,000 cy of contaminated soils;
- Excavation and storage on-site for eventual treatment or placement into the lagoon area of 135,000 cy of soils found to be contaminated with low levels of PAHs during the design phase
- Pumping and on-site treatment of groundwater;
- Monitoring of groundwater downgradient of Ice Creek and preparation of a contingency plan; and
- Fencing, security, and deed restrictions.

B. Remedial Action

GDA - OU1

Remedial construction activities at the GDA began in July 1993 after completion of the remedial design. Construction activities included:

- Construction of a soil-bentonite perimeter barrier to enclose the capped GDA wastes. The perimeter barrier is designed to provide a low permeability barrier to ground water in-flow and contaminant migration;
- Construction of a permanent cap incorporating a geosynthetic clay liner to minimize future exposure of the buried waste and minimize infiltration;
- Installation and operation of ground water extraction wells inside and outside the GDA to provide hydraulic control for pollution migration;
- Construction of a waste water treatment facility to treat extracted groundwater from

inside and outside the GDA including biological and carbon adsorption polishing systems;

- Installation of wells to monitor the remedial action performance including the containment of dissolved and free phase contaminant plume migration;
- Complete a delineation of the NAPs layer and evaluate potentially feasible technologies to address this layer; and
- Construction of a perimeter security fence.

In addition, during the early stages of the RA, an alternative water supply was provided to Ironton Iron Inc. Final inspection of the site was conducted on August 2, 1995. The responsible parties submitted a Remedial Action (RA) Report on September 6, 1995. The U.S. EPA approved the final RA Report on September 19, 1995.

Soil-Bentonite Perimeter Barrier Performance

The soil-bentonite perimeter barrier has been shown to be adequate in preventing migration of site contaminants and providing a low-permeability barrier to ground water in-flow.

Landfill Cover System Performance

The permanent cap incorporating a geosynthetic liner has been shown to be adequate in minimizing exposure of the buried waste and infiltration.

Waste Water Treatment Facility Performance

The biological and carbon adsorption polishing systems of the waste water treatment facility have been shown to be adequate in treating ground water extracted from inside and outside the GDA.

Ground Water Monitoring and Extraction Activities

AlliedSignal has been submitting quarterly progress reports on the GDA since 1995. The quarterly reports address the RD/RA Monitoring Plan which includes groundwater monitoring for water levels and quality, gas monitoring at the site cap vents, and NAPS monitoring for migration analysis. In addition, the reports provide a summary of water pumped from the GDA that was treated and discharged. As of the third quarter of 1998 a total of 220,475,573 gallons of water has been treated and discharged, 208,442,675 from outside the perimeter barrier and 12,032,898 from inside the barrier.

Specifics of the quarterly reports include groundwater monitoring for water levels and quality. Water levels are measured to monitor the progress of the groundwater extraction process in its ability to achieve the desired inward gradient across the containment barrier, such that the groundwater elevations within the containment is lower than the water table outside. Except for

a few fluctuations due to a flooding event and maintenance or temporary shutdown of an extraction well, groundwater levels have been consistently lower inside the containment barrier than outside and a positive gradient, indicating flow from outside to inside has been maintained. Fortunately, the fluctuations that have occurred have been concentrated in the northwest corner of the GDA where any outflow can be captured by another extraction well located outside the containment barrier.

Groundwater quality is measured inside and outside of the GDA. This monitoring provides information on overall groundwater quality as well as the effectiveness of the pumping and containment system. All groundwater samples are analyzed for BTEX, PAHs, TPHC, pH, total and amenable cyanide, total phenols, ammonia, and arsenic. The parameter of free cyanide is also included for the extraction wells because it is a monitoring parameter at the internal outfalls in the wastewater treatment facility where the water is eventually discharged. Groundwater cleanup standards were established in the original September 1988 GDA ROD and a subsequent July 1995 ROD Amendment which modified a couple of parameters. In general, overall groundwater quality appears to be little changed over the course of the quarterly reporting. However, the general consistency of groundwater quality trends appears to indicate that the pumping and containment appears to be adequate in partially removing contamination.

Gas vent monitoring at the GDA consists of quarterly sampling of four gas vents within the perimeter barrier. Samples are analyzed for volatile organics (VOCs), oxygen, and methane. A variety of volatile organics have been consistently detected in the quarterly samples. Methane has predominantly not been detected, however, low percentages occur sporadically. Oxygen percentages fall in a range from the upper teens to the lower twenties.

As part of the groundwater level measurements, specific wells are also checked for the presence of NAPS or free product. In addition, samples are collected from a couple of monitoring wells and specifically analyzed to determine the presence or contribution of NAPS to contamination in the well. The presence of NAPS is determined by using the Flexidip/Ullage-Interface Meter which can detect the presence of separate oil/NAPS layer. A sampling cup, specifically designed for dipping the NAPS wells, is also used to visually check for the presence of NAPS. During the course of the quarterly monitoring a NAPS layer has not been detected using the Ullage Meter or visually by physically taking a bottom sample. Similar to the overall groundwater quality monitoring, groundwater samples from two NAPS monitoring wells are analyzed for BTEX, PAHs, TPHC, pH, total and amenable cyanide, total phenols, ammonia, and arsenic. Throughout the quarterly monitoring variable levels of VOCs and PAHs heve been detected, while levels of inorganics and ammonia have remained relatively constant. The levels of PAHs and VOCs may be influenced by the presence of a NAPS layer.

As part of the five-year review process the U.S. EPA reviewed the quarterly progress reports and solicited comments from the Ohio EPA. Questions were raised by the Agencies and a meeting was held in February 1999, to discuss GDA groundwater program performance. U.S. EPA met with AlliedSignal and the Ohio EPA to discuss GDA groundwater capture zone determination,

slurry wall performance, and NAPS monitoring. As a result of this meeting, AlliedSignal produced an analysis of the groundwater modeling and capture zone analysis for the GDA as well as the CPLA. This document was reviewed by U.S. EPA and comments have been forwarded to AlliedSignal.

In general, the U.S. EPA found that the methods being employed to evaluate the effectiveness of the GDA groundwater extraction system were acceptable. Comments were mostly concerned with the limited number of water level monitoring points. The U.S. EPA believed that even though adequate interpretation could be made from the existing water level monitoring network, additional monitoring points would better demonstrate the effectiveness of the capture of ground water affected by the NAPS and could increase the confidence in the analysis. U.S. EPA will continue to work with AlliedSignal to optimize the groundwater program.

Activities and Schedules for Site Completion

Long-term operation and maintenance of the perimeter barrier, cover system, and the groundwater program are the responsibility of AlliedSignal.

The remedial action will continue until the groundwater remedy attains federal and state ARARs and groundwater clean-up standards established in the original GDA Record of Decision (ROD) dated September 29, 1988, and partially revised in a ROD Amendment dated July 31, 1995. As referenced in the September 1988, GDA ROD, it may not be technically feasible to achieve groundwater clean-up standards for the contaminated ground water outside the GDA due to the presence of high levels of benzene and NAPS. The U.S. EPA will continue to evaluate the data from the groundwater extraction and treatment system and will re-evaluate the clean-up standards every five years to determine if it is technically practicable to remediate the NAPS.

To ensure that all constituents present in the ground water are within U.S. EPA's acceptable risk range, AlliedSignal must demonstrate that the groundwater is within the allowable risk range prior to turning off the groundwater pump and treatment system.

CPLA - OU2

Design and construction activities for the CPLA were separated into phases including incineration, bioremediation, and a groundwater program. Incineration and bioremediation were revised during RD after information was collected indicating alternatives that were potentially more efficient and cost-effective. To date, after modifications discussed in three ROD amendments construction activities included:

- Excavation, recycling, and disposal of contaminated material and soils from the lagoons and other areas in the main coke plant;
- Installation and operation of ground water extraction wells inside and outside the CPLA, including Ice Creek, to provide hydraulic control for pollution migration; and

- Installation of wells to monitor the remedial action performance and containment provided by the extraction wells.

Excavation, Recycling, and Disposal

To date, approximately 223, 000 tons of contaminated material has been excavated from the CPLA. Approximately 108, 000 tons have been recycled or used as an alternative fuel with approximately 22,000 tons still on-site but scheduled for use as an alternative fuel. Approximately 176 tons of KO87 hazardous waste has been recycled. Almost 45,000 tons of low-level contaminated material has been disposed off-site in landfills. Another approximately 48,000 tons has been approved as backfill after completion of the Lagoon 5 excavation. AlliedSignal estimates that there are still between 120,000 to 150,000 tons of material left to remove with the majority of this material being used as an alternative fuel at a nearby power generator and smaller amounts being disposed off-site.

Ground Water Monitoring and Extraction Activities

AlliedSignal has been submitting quarterly progress reports on the CPLA and Ice Creek compliance sampling program since December of 1996. The quarterly reports include monitoring of field parameters and chemical concentrations. In addition, AlliedSignal is required to periodically evaluate the effectiveness of the groundwater migration control system. Extracted groundwater is treated on-site in a water treatment facility constructed as part of the remedial action for the GDA-OU1.

Groundwater monitoring continues to show the presence of levels of PAHs and benzene exceeding clean-up levels established in the original CPLA ROD and subsequent ROD Amendments.

More controversial has been the configuration of monitoring points AlliedSignal has selected for using the triangulation method to determine the effectiveness of the migration control system. During design of the groundwater extraction system, it was decided that triangulation was the best available technology at the time. Recently, both the Agencies and AlliedSignal have examined other methodologies as well as modification to the existing system that may be more efficient ways to assess the effectiveness of the migration control system. As part of a February 1999 meeting with AlliedSignal, the Agencies discussed this issue and will continue to work with Allied to determine the need to modify the system. The Agencies are also in the process of reviewing a submittal by AlliedSignal presenting an analysis of the capture zone and groundwater modeling for the CPLA. Comments from this review will be forwarded to AlliedSignal for further discussion.

Activities and Schedules for Site Completion

AlliedSignal has the lead in implementing the remedial action at the CPLA including excavation,

recycling, and disposal of contaminated material. These activities are ongoing, and are scheduled to be completed by late 1999 or early 2000. After completion of excavation, AlliedSignal will implement the wetlands development of the lagoon area. AlliedSignal will be responsible for long-term operation and maintenance of the wetlands.

The remedial action for the CPLA groundwater will continue until the remedy attains federal and state ARARs and groundwater clean-up standards established in the original CPLA ROD dated December 28, 1990, and partially revised in a ROD Amendment dated July 31, 1995.

To ensure that all constituents present in the ground water are within U.S. EPA's acceptable risk range, AlliedSignal must demonstrate that the groundwater is within the allowable risk range prior to turning off the groundwater pump and treatment system.

III. RECOMMENDATIONS

GDA - OU1

U.S. EPA recommends that the groundwater program and long-term operation and maintenance of the slurry wall and cover system continue. U.S. EPA will continue to work with AlliedSignal to modify the groundwater program to better demonstrate the effectiveness of the capture of ground water affected by the NAPS at the GDA, which may include the addition of more monitoring points. AlliedSignal should continue to evaluate the technical feasibility of remediating the NAPS.

CPLA - OU2

U.S. EPA recommends that the groundwater program, excavation, recycling, and disposal of contaminated materials continue. U.S. EPA will continue to work with AlliedSignal to modify the groundwater program to better demonstrate the effectiveness of the migration control system at the CPLA, which may include the addition of more monitoring points.

IV. STATEMENT OF PROTECTIVENESS

U.S. EPA certifies that the remedy selected for this site remains protective of human health and the environment.

V. NEXT FIVE-YEAR REVIEW

The next five-year review will be in August 2003.